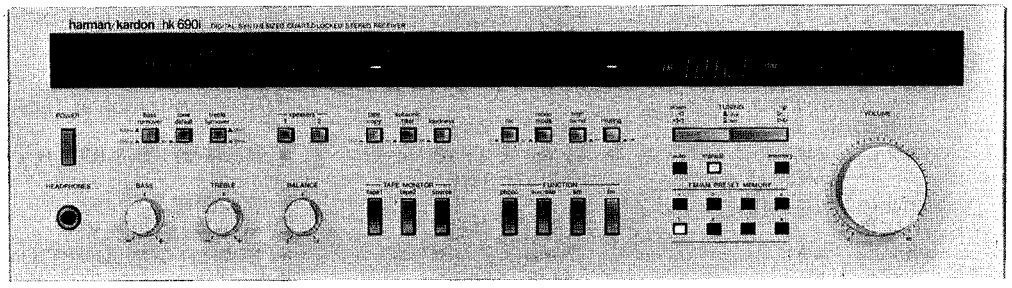
The Harman Kardon Model hk690

Manual No. 70A

DIGITAL SYNTHESIZED QUARTZ-LOCKED STEREO RECEIVER

Technical Manual



harman/kardon
240 CROSSWAYS PARK WEST, WOODBURY, N.Y. 11797
1112-H15270A4 P-088311 1250 PRINTED IN JAPAN

SPECIFICATIONS

• FM SECTION	Nominal	Limit
Tuning Range	87.5 ~ 108.0MHz	
50dB Quieting Sensitivity		
Mono	16.6dBf	≦ 18dBf
Stereo	38.5dBf	≦ 40dBf
Usable Sensitivity	11.5dBf	≦ 14.5dBf
Image Ratio	77dB	≧ 70dB
IF Rejection	95dB	≧ 85dB
Spurious Response Rejection	114dB	≧ 95dB
Capture Ratio	1.0dB	≦ 2.0dB
Alternate Channel Selectivity	63dB	≧ 50dB
AM Rejection	56dB	≧ 45dB
Signal to Noise Ratio		
Mono	82dB	≧ 78dB
Stereo	73dB	≧ 70dB
Total Harmonic Distortion (65dBf 1kHz Input)		
Mono	0.06%	≦ 0.15
Stereo	0.08%	≦ 0.3%
Stereo Separation at 1kHz	58dB	≧ 45dB
• AM SECTION		
Tuning Range	520 ~ 1,710kHz	
Usable Sensitivity	14μV	≦ 20μV
Selectivity	53dB	≧ 35dB
Signal to Noise Ratio	55dB	≧ 50dB
Image Rejection	44dB	≧ 38dB
IF Rejection	60dB	≧ 50dB
• AUDIO SECTION		
Usable Sensitivity		
AUX/DAD	135mV ± 25mV	
Phono MM	2.2mV ± 0.2mV	
MC	120μV ± 15μV	
Signal to Noise Ratio		
AUX/DAD	79.5dB	≧ 78dB
Phono MM	79dB	≧ 77dB
MC	77dB	≧ 74dB

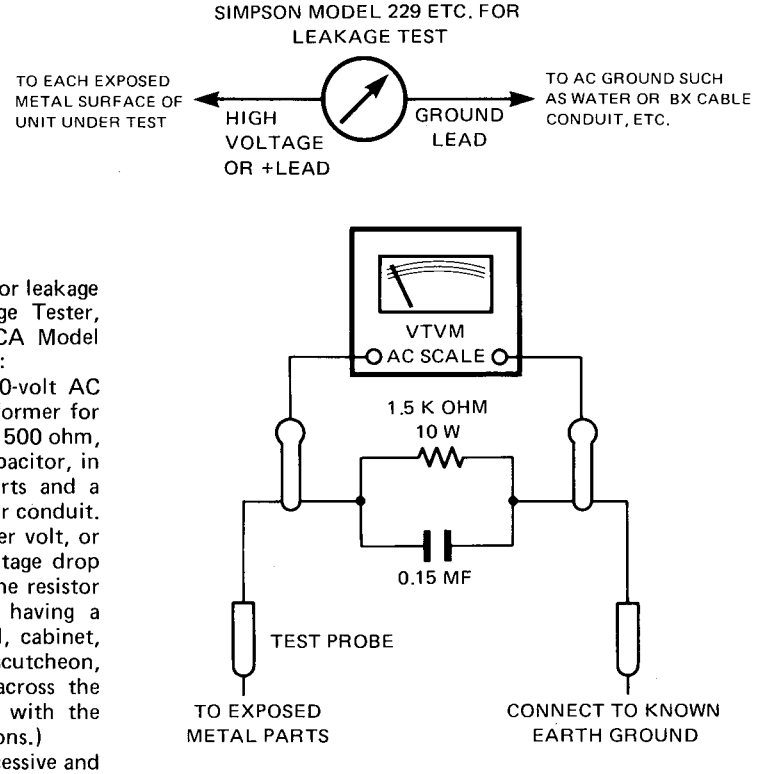
	Nominal	Limit
Channel Separation at 10kHz		
AUX/DAD	54dB	≧ 45dB
Phono MM	54dB	≧ 45dB
MC	58dB	≧ 45dB
IM Distortion Ratio	0.05%	≦ 0.1%
RMS Output Power		
8Ω, 1kHz, THD 0.08%	68W	≧ 60W
4Ω, 1kHz, THD 0.08%	102W	≧ 90W
Damping Factor at 1kHz	67	≧ 50
Tone Control Characteristics		
Bass Turnover Frequency	400Hz/200Hz	
Treble Turnover Frequency	2kHz/6kHz	
Bass at 50Hz		
Boost	10dB ± 2dB	
Cut	−10dB ± 2dB	
Treble at 10kHz		
Boost	10dB ± 2dB	
Cut	−10dB ± 2dB	
Loudness Control		
at 10kHz	3dB ± 1dB	
at 50Hz	10dB ± 2dB	
Subsonic Control		
at 15Hz	3dB ± 1dB	
DC Output Voltage		
L channel	0mV ± 60mV	
R channel	0mV ± 60mV	
RIAA Equalization at Tape Out (20Hz/20kHz)	0.2dB ± 0.5dB/0.1dB ± 0.5dB	
• DIMENTIONS (W x H x D)	17-7/16" x 5-1/4" x 14-3/8" (443 x 135 x 365 mm)	
• WEIGHT	24 lbs. 4 oz. (11 kg)	
• POWER SUPPLY	AC120V, 60Hz	
• POWER CONSUMPTION	400W (440VA)	

This specification is the target of servicing. But, there is a case that the specification is not applicable to the measurement condition and instrument.
Specifications and components subject to change without notice. Overall performance will be maintained or improved.

LEAKAGE TEST

Before returning the unit to the user, perform the following safety checks:

1. Inspect all lead dress to make certain that leads are not pinched or that hardware is not lodged between the chassis and other metal parts in the unit.
2. Be sure that any protective devices such as nonmetallic control knobs, insulating fishpapers, cabinet backs, adjustment and compartment covers or shields, isolation resistor-capacity networks, mechanical insulators, etc. which were removed for servicing are properly reinstalled.
3. Be sure that no shock hazard exists; check for leakage current using Simpson Model 229 Leakage Tester, standard equipment item No. 21641, RCA Model WT540A or use alternate method as follows:
   Plug the AC line cord directly into a 120-volt AC receptacle (do not use an Isolation Transformer for this test). Using two clip leads, connect a 1500 ohm, 10-watt resistor paralleled by a 0.15mf capacitor, in series with all exposed metal cabinet parts and a known earth ground, such as a water pipe or conduit. Use a VTVM or VOM with 1000 ohms per volt, or higher, sensitivity to measure the AC voltage drop across the resistor. (See Diagram.) Move the resistor connection to each exposed metal part having a return path to the chassis (antenna, metal, cabinet, screw heads, knobs and control shafts, escutcheon, etc.) and measure the AC voltage drop across the resistor. (This test should be performed with the power switch in both the On and Off positions.)
   A reading of 0.35 volt RMS or more is excessive and indicates a potential shock hazard which must be corrected before returning the unit to the owner.


SIMPSON MODEL 229 ETC. FOR LEAKAGE TEST
TO EACH EXPOSED METAL SURFACE OF UNIT UNDER TEST
HIGH VOLTAGE OR +LEAD
GROUND LEAD
TO AC GROUND SUCH AS WATER OR BX CABLE CONDUIT, ETC.
VTVM
AC SCALE
1.5 K OHM
10 W
0.15 MF
TEST PROBE
TO EXPOSED METAL PARTS
CONNECT TO KNOWN EARTH GROUND

ALIGNMENT PROCEDURES

■ AMPLIFIER SECTION

- **DC balance and idling adjustments**

Conditions:
- Set the function switch to aux/DAD.
- Set the volume to minimum.
- Set the speaker system switches 1 and 2 to OFF.
- Make sure that primary supply voltage comes within 120 V ± 2V.
- Make the adjustment at a room temperature of 25°C.

Step	Item	Connections required	Adjustment location	Correct value
1	DC balance adjustment	Connect the digital voltmeter between TP1 and ground.	VR401 (L channel)	0 ± 10mV
2		Connect the digital voltmeter between TP2 and ground.	VR402 (R channel)	0 ± 10mV
3	Idling adjustment	Connect the digital voltmeter to TP3 and TP4.	VR403 (L channel)	30mV
4		Connect the digital voltmeter to TP5 and TP6.	VR404 (R channel)	30mV
5	Repeat steps 1 through 4 after aging for 10 minutes.			

■ TUNER SECTION

1. STANDARD FREQUENCY CHECK

Condition: • Set the function switch to FM.

Step	Connections required	Measurement frequency	Station display	Adjustment location	Adjustment method
1	• Connect the frequency counter to TP7 (+) and ground (—).		98.3 MHz		109MHz ± 2kHz

2. AM ALIGNMENT

Conditions:
- Set the function switch to AM.
- Set the muting switch to off (▬).

Step	Item	Connections required	Measurement frequency	Station display	Adjustment location	Adjustment method
1	Tuning voltage adjustment	• Connect the DC voltmeter to TP11 (+) and ground (—).		520kHz	L252	1.5V ± 0.05V
2				1710kHz	TC252	23V ± 0.5V
3	IF adjustment	• Radiate output of AM signal generator (400Hz 30% modulation) to AM loop antenna. • Connect oscilloscope to TP8 (+) and ground (—).	450kHz	1600kHz	T251 T252	Adjust so that peak and good waveform.
4	Tracking adjustment	• Radiate output of AM signal generator (400Hz 30% modulation) to AM loop antenna. • Connect oscilloscope and AC voltmeter to TAPE 1 OUT terminals.	600kHz	600kHz	L251	Maximize the output level.
5			1400kHz	1400kHz	TC251	
6		Repeat steps 4 and 5.				
7	Tuned indicator confirmation	• Radiate output of AM signal generator (400Hz 30% modulation) to AM loop antenna.	1000kHz	1000kHz		Confirm the tuned indicator lights at 60 dB input.

3. FM ALIGNMENT

Conditions:
- Set the function switch to FM.
- Set the muting switch to off (▬).

Step	Item	Connections required	Measurement frequency	Station display	Adjustment location	Adjustment method
1	Discriminator adjustment	• Connect the FM signal generator (1kHz 100% modulation) to FM 300Ω BAL ANT terminals through the 300Ω balanced dummy. • Connect the oscilloscope and distortion meter to TAPE 1 OUT terminals.	98.14MHz	98.1MHz	T201 (A)	Adjust so that the waveforms in steps 1 and 2 become the same level. At this time tuned indicator lights.
2			98.06MHz	98.1MHz	T201 (A)	
3			98.1MHz	98.1MHz	T201 (B)	Adjust so that the distortion becomes minimum.
4		Repeat steps 1 through 3.				
5	Tuned indicator adjustment	• Same as above. • Connect the DC voltmeter to TP9 (+) and ground (—).			VR201	Adjust so that the tuned indicator lights at 10μV input.
6	Signal indicator adjustment				VR202	Adjust so that the DC voltage becomes 11V at 1mV input. And then, confirm the five signal indicator lights.
7	MPX adjustment	• Connect the stereo modulator (L + R = 45.5%, L — R = 45.5%, 19kHz = 9%) to FM signal generator. • Apply signal generator output to FM 300Ω BAL ANT terminals through the 300Ω balanced dummy. • Connect the frequency counter to TP10 (+) and ground (—). • Connect the oscilloscope and AC voltmeter to TAPE 1 OUT terminals.	98.1MHz (unmodulation)	98.1MHz	VR151	19.00kHz ± 0.02kHz
8			98.1MHz	98.1MHz	VR351	Confirm the stereo indicator lights at 30μV ±2dB input.
9			98.1MHz	98.1MHz	VR152	Set the stereo modulator to 19kHz only. Adjust so that L and R output level becomes minimum.
10			98.1MHz	98.1MHz	VR301	Adjust so that the right channel output becomes minimum when only the left channel of the stereo modulator modulated and so that the left channel output becomes minimum when only the right channel modulated.

ALIGNMENT PROCEDURES

■ AMPLIFIER SECTION

- **DC balance and idling adjustments**

Conditions:
- Set the function switch to aux/DAD.
- Set the volume to minimum.
- Set the speaker system switches 1 and 2 to OFF.
- Make sure that primary supply voltage comes within 120 V ± 2V.
- Make the adjustment at a room temperature of 25°C.

Step	Item	Connections required	Adjustment location	Correct value
1	DC balance adjustment	Connect the digital voltmeter between TP1 and ground.	VR401 (L channel)	0 ± 10mV
2		Connect the digital voltmeter between TP2 and ground.	VR402 (R channel)	0 ± 10mV
3	Idling adjustment	Connect the digital voltmeter to TP3 and TP4.	VR403 (L channel)	30mV
4		Connect the digital voltmeter to TP5 and TP6.	VR404 (R channel)	30mV
5	Repeat steps 1 through 4 after aging for 10 minutes.			

■ TUNER SECTION

1. STANDARD FREQUENCY CHECK

Condition: • Set the function switch to FM.

Step	Connections required	Measurement frequency	Station display	Adjustment location	Adjustment method
1	• Connect the frequency counter to TP7 (+) and ground (−).		98.3 MHz		109MHz ± 2kHz

2. AM ALIGNMENT

Conditions:
- Set the function switch to AM.
- Set the muting switch to off (▬).

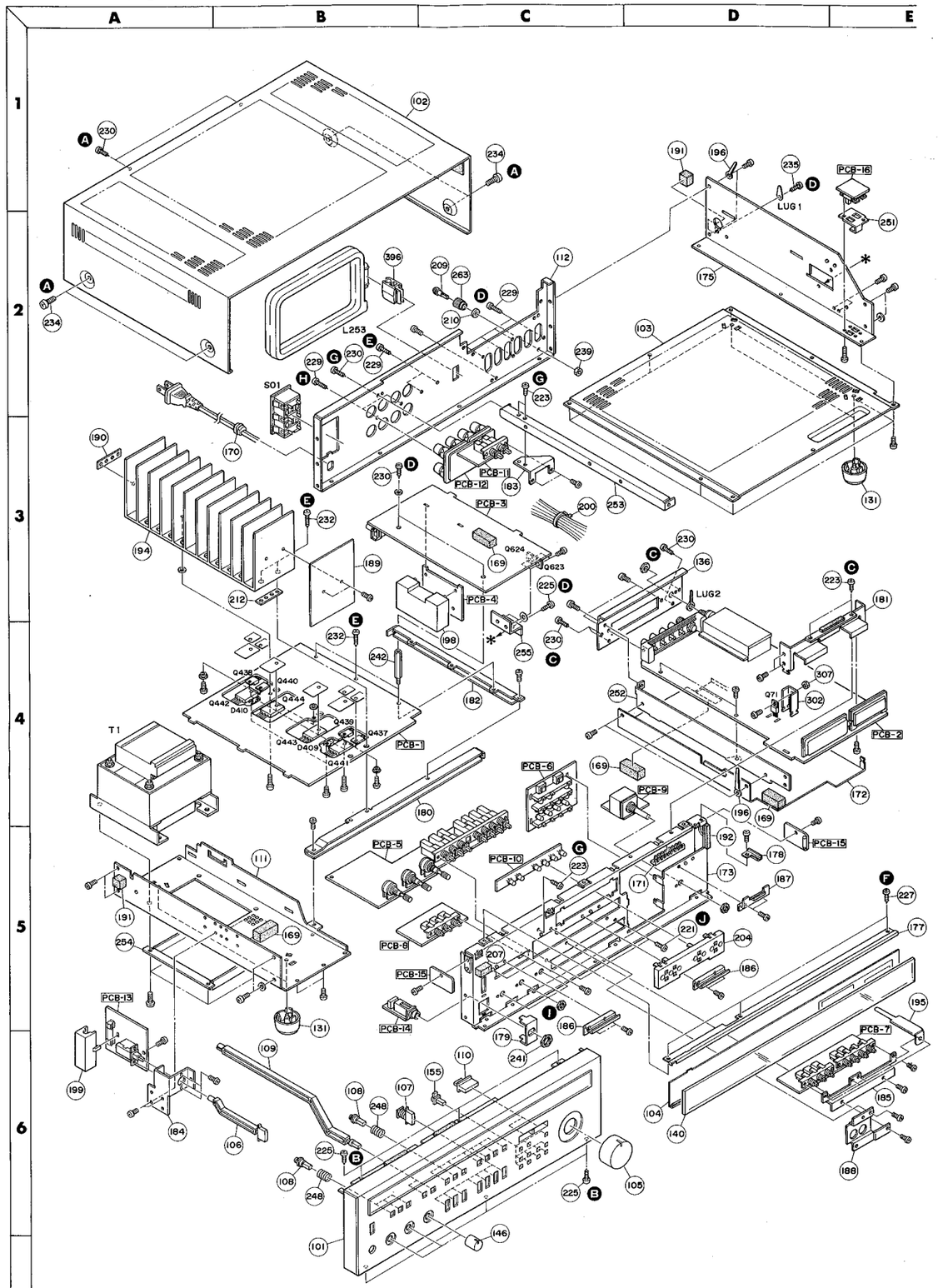
Step	Item	Connections required	Measurement frequency	Station display	Adjustment location	Adjustment method
1	Tuning voltage adjustment	• Connect the DC voltmeter to TP11 (+) and ground (−).		520kHz	L252	1.5V ± 0.05V
2				1710kHz	TC252	23V ± 0.5V
3	IF adjustment	• Radiate output of AM signal generator (400Hz 30% modulation) to AM loop antenna. • Connect oscilloscope to TP8 (+) and ground (−).	450kHz	1600kHz	T251 T252	Adjust so that peak and good waveform.
4	Tracking adjustment	• Radiate output of AM signal generator (400Hz 30% modulation) to AM loop antenna. • Connect oscilloscope and AC voltmeter to TAPE 1 OUT terminals.	600kHz	600kHz	L251	Maximize the output level.
5			1400kHz	1400kHz	TC251	
6		Repeat steps 4 and 5.				
7	Tuned indicator confirmation	• Radiate output of AM signal generator (400Hz 30% modulation) to AM loop antenna.	1000kHz	1000kHz		Confirm the tuned indicator lights at 60 dB input.

3. FM ALIGNMENT

Conditions: • Set the function switch to FM.
• Set the muting switch to off (▬).

Step	Item	Connections required	Measurement frequency	Station display	Adjustment location	Adjustment method
1	Discriminator adjustment	• Connect the FM signal generator (1kHz 100% modulation) to FM 300Ω BAL ANT terminals through the 300Ω balanced dummy. • Connect the oscilloscope and distortion meter to TAPE 1 OUT terminals.	98.14MHz	98.1MHz	T201 (A)	Adjust so that the waveforms in steps 1 and 2 become the same level. At this time tuned indicator lights.
2			98.06MHz	98.1MHz	T201 (A)	
3			98.1MHz	98.1MHz	T201 (B)	Adjust so that the distortion becomes minimum.
4		Repeat steps 1 through 3.				
5	Tuned indicator adjustment	• Same as above. • Connect the DC voltmeter to TP9 (+) and ground (−).			VR201	Adjust so that the tuned indicator lights at 10μV input.
6	Signal indicator adjustment				VR202	Adjust so that the DC voltage becomes 11V at 1mV input. And then, confirm the five signal indicator lights.
7	MPX adjustment	• Connect the stereo modulator (L + R = 45.5%, L − R = 45.5%, 19kHz = 9%) to FM signal generator. • Apply signal generator output to FM 300Ω BAL ANT terminals through the 300Ω balanced dummy. • Connect the frequency counter to TP10 (+) and ground (−). • Connect the oscilloscope and AC voltmeter to TAPE 1 OUT terminals.	98.1MHz (unmodulation)	98.1MHz	VR151	19.00kHz ± 0.02kHz
8			98.1MHz	98.1MHz	VR351	Confirm the stereo indicator lights at 30μV ±2dB input.
9			98.1MHz	98.1MHz	VR152	Set the stereo modulator to 19kHz only. Adjust so that L and R output level becomes minimum.
10			98.1MHz	98.1MHz	VR301	Adjust so that the right channel output becomes minimum when only the left channel of the stereo modulator modulated and so that the left channel output becomes minimum when only the right channel modulated.

GENERAL UNIT EXPLODED VIEW



DISASSEMBLY PROCEDURES (REFER TO PAGES 5 AND 18)

1 CABINET TOP REMOVAL
Remove 6 screws Ⓐ and then remove the cabinet top.

2 FRONT PANEL ASSEMBLY REMOVAL
1. Remove the cabinet top. (Refer to step 1 .)
2. Pull off Volume, Bass, Treble and Balance knobs (105 and 146).
3. Remove 6 screws Ⓑ and then remove the front panel assembly.

3 TUNER P.C. BOARD (PCB-2) REMOVAL
1. Remove the cabinet top. (Refer to step 1 .)
2. Disconnect J302, J303 and J351 from P302, P303 and P351 on the tuner P.C. board (PCB-2).
3. Open the lid of connectors (P301, P352 and P353) on the tuner P.C. board (PCB-2) and then disconnect the lead wires.
4. Remove 6 screws Ⓒ and then remove the tuner P.C. board (PCB-2) with back plate (136), shield plate (172) and brackets (181 and 252).

4 PHONO EQUALIZER P.C. BOARD (PCB-3) REMOVAL
1. Remove the tuner P.C. board (PCB-2). (Refer to step 3.)
2. Remove 8 screws Ⓓ and then remove the phono equalizer P.C. board (PCB-3) with MC amp. P.C. board (PCB-4) and holder (198). At this time, open the lid of connectors (P601, P602, P603, P604, P605 and P801) on the phono equalizer P.C. board (PCB-3) and then disconnect the lead wires and unsolder the lead wires from phono equalizer P.C. board (PCB-3).

5 POWER OUTPUT P.C. BOARD (PCB-1) REMOVAL
1. Remove the phono equalizer and MC amp. P.C. boards (PCB-3 and PCB-4). (Refer to step 4 .)
2. Remove 5 screws Ⓔ and 2 shafts (242) and then remove the power output P.C. board (PCB-1). At this time, open the lid of connector (P401) on the power output P.C. board (PCB-1) and then disconnect the lead wires and unsolder the lead wires from power output P.C. board (PCB-1).

6 SPEAKER SWITCH AND SPEAKER TERMINAL P.C. BOARDS (PCB-11 AND PCB-12) REMOVAL
1. Remove the front panel assembly and power output P.C. board (PCB-1). (Refer to steps 2 and 5 .)
2. Remove 3 screws Ⓕ and then remove the panel back assembly (104) and the panel (140).
3. Remove 4 screws Ⓖ and then remove the bracket (253).
4. Pull off the 2 push button assemblies (109).
5. Remove 2 screws Ⓗ and then remove the speaker switch and speaker terminal P.C. boards (PCB-11 and PCB-12) with bracket (183). If necessary, unsolder the lead wires.

7 TONE CONTROL P.C. BOARD (PCB-5) REMOVAL
1. Remove the speaker switch and speaker terminal P.C. boards (PCB-11 and PCB-12). (Refer to step 6 .)
2. Remove 3 hexagon nuts Ⓘ and 2 screws Ⓙ and then remove the tone control P.C. board (PCB-5). At this time, open the lid of connector (P501) on the tone control P.C. board (PCB-5) and then disconnect the lead wires and unsolder the lead wires from tone control P.C. board (PCB-5).

CIRCUIT DESCRIPTION

[1] MUTING CIRCUIT
The muting control voltage is taken out from ⑫ pin of IC201 and then fed to the base of Q205. At the weak station or detuned point, the ⑫ pin becomes high level, Q205 becomes low, Q357 is tuned off, NAND IC352 is tuned to low, Q360 is tuned to on, Q361 (left channel) and Q362 (right channel) are tuned to on and muting operation is completed.

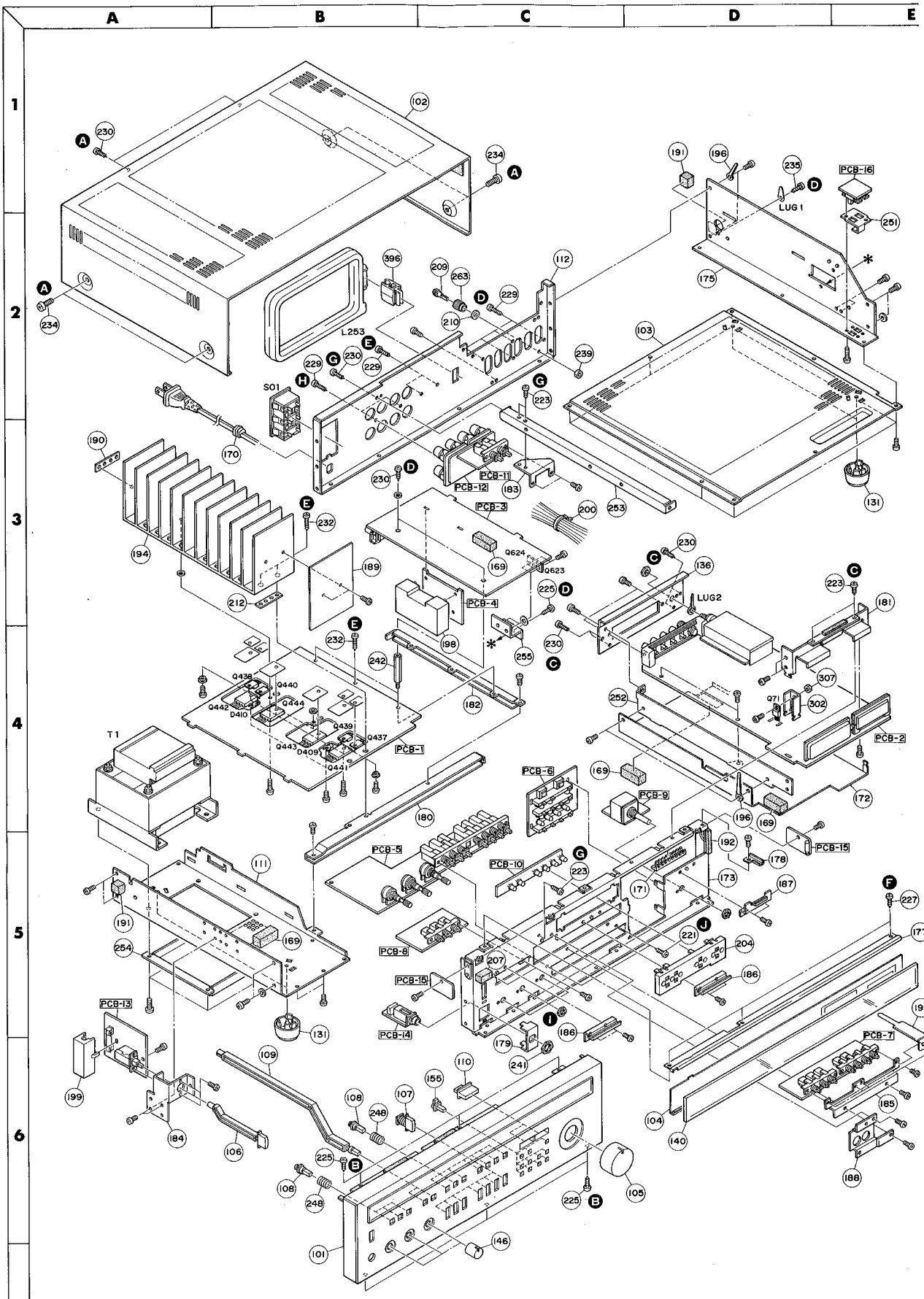
[2] SYNTHESIZER SECTION
1) FM
The output of local oscillator in the front-end is fed to ⑤ pin of the pre-scaler IC701 and then divided by 30 or 32 and fed to ㊲ pin of the PLL synthesizer IC702. The standard quartz oscillator output (4.5MHz) is divided by 180 in IC702 and 25kHz standard signal is got. The divided local oscillator output is compared with the 25kHz standard signal in the phase comparator.
When the divided local oscillator frequency is higher than standard frequency, ㉟ pin of IC702 becomes high level but when it is lower, ㉟ pin of IC702 becomes low level. When the both frequencies are equal, ㉟ pin becomes floating.
㉟ pin output of IC702 is fed to the vari-cap diode of the front-end through L.P.F. (Q702, Q703, Q712) and controls the frequency of VCO (local oscillator frequency).
2) AM
The local oscillator output of AM IC251 is fed to ㊴ pin of the PLL synthesizer IC702 and divided. The standard quartz oscillator output (4.5MHz) is divided by 450 in IC702 and 10kHz standard signal is got. The divided local oscillator output is compared with the 10kHz standard signal in phase comparator.

[3] PRESET MEMORY
1) Memorizing
When one of the preset keys, M1 to M8 is depressed, one of the ⑫ to ⑲ pins of IC702 becomes high level. The displayed frequency is memorized into the memory (RAM) with correspond to the depressed key.
2) Recalling
When one of the preset keys, M1 to M8 is depressed, the contents of the memory (frequency) is recalled.

[4] FM/AM STATION SCANNING
1) When tuning mode switch is set to AUTO
When the UP key is depressed, the frequency rises at saw tooth wave mode and when DOWN key is depressed, the frequency falls. When the high level input is fed to stop terminal (㉝ pin of IC702), the scanning is stopped.
2) When tuning mode switch is set to MANUAL
Whenever UP or DOWN key is depressed once, the frequency rises or falls by one step (channel space).

[5] OVERLOAD PROTECTION (LEFT CHANNEL)
As soon as the current over rated power flows, the voltage between both emitters of Q441 and Q443 rises, Q9, Q8 and Q7 are turned to on, Q1 is turned to off. So Q3 (schmit trigger circuit) is tuned to off. The gate of Q401 becomes 0V and Q401 is turned to on. The input to power amp. is cut and Q417 is turned to off. So the operation of pre-driver, driver and power stages stops and the circuit is protected.

GENERAL UNIT EXPLODED VIEW



DISASSEMBLY PROCEDURES (REFER TO PAGES 5 AND 18)

1 CABINET TOP REMOVAL
Remove 6 screws Ⓐ and then remove the cabinet top.

2 FRONT PANEL ASSEMBLY REMOVAL
1. Remove the cabinet top. (Refer to step 1 .)
2. Pull off Volume, Bass, Treble and Balance knobs (105 and 146).
3. Remove 6 screws Ⓑ and then remove the front panel assembly.

3 TUNER P.C. BOARD (PCB-2) REMOVAL
1. Remove the cabinet top. (Refer to step 1 .)
2. Disconnect J302, J303 and J351 from P302, P303 and P351 on the tuner P.C. board (PCB-2).
3. Open the lid of connectors (P301, P352 and P353) on the tuner P.C. board (PCB-2) and then disconnect the lead wires.
4. Remove 6 screws Ⓒ and then remove the tuner P.C. board (PCB-2) with back plate (136), shield plate (172) and brackets (181 and 252).

4 PHONO EQUALIZER P.C. BOARD (PCB-3) REMOVAL
1. Remove the tuner P.C. board (PCB-2). (Refer to step 3.)
2. Remove 8 screws Ⓓ and then remove the phono equalizer P.C. board (PCB-3) with MC amp. P.C. board (PCB-4) and holder (198). At this time, open the lid of connectors (P601, P602, P603, P604, P605 and P801) on the phono equalizer P.C. board (PCB-3) and then disconnect the lead wires and unsolder the lead wires from phono equalizer P.C. board (PCB-3).

5 POWER OUTPUT P.C. BOARD (PCB-1) REMOVAL
1. Remove the phono equalizer and MC amp. P.C. boards (PCB-3 and PCB-4). (Refer to step 4 .)
2. Remove 5 screws Ⓔ and 2 shafts (242) and then remove the power output P.C. board (PCB-1). At this time, open the lid of connector (P401) on the power output P.C. board (PCB-1) and then disconnect the lead wires and unsolder the lead wires from power output P.C. board (PCB-1).

6 SPEAKER SWITCH AND SPEAKER TERMINAL P.C. BOARDS (PCB-11 AND PCB-12) REMOVAL
1. Remove the front panel assembly and power output P.C. board (PCB-1). (Refer to steps 2 and 5 .)
2. Remove 3 screws Ⓕ and then remove the panel back assembly (104) and the panel (140).
3. Remove 4 screws Ⓖ and then remove the bracket (253).
4. Pull off the 2 push button assemblies (109).
5. Remove 2 screws Ⓗ and then remove the speaker switch and speaker terminal P.C. boards (PCB-11 and PCB-12) with bracket (183). If necessary, unsolder the lead wires.

7 TONE CONTROL P.C. BOARD (PCB-5) REMOVAL
1. Remove the speaker switch and speaker terminal P.C. boards (PCB-11 and PCB-12). (Refer to step 6 .)
2. Remove 3 hexagon nuts Ⓘ and 2 screws Ⓙ and then remove the tone control P.C. board (PCB-5). At this time, open the lid of connector (P501) on the tone control P.C. board (PCB-5) and then disconnect the lead wires and unsolder the lead wires from tone control P.C. board (PCB-5).

CIRCUIT DESCRIPTION

[1] MUTING CIRCUIT
The muting control voltage is taken out from ⑫ pin of IC201 and then fed to the base of Q205. At the weak station or detuned point, the ⑫ pin becomes high level, Q205 becomes low, Q357 is tuned off, NAND IC352 is tuned to low, Q360 is tuned to on, Q361 (left channel) and Q362 (right channel) are tuned to on and muting operation is completed.

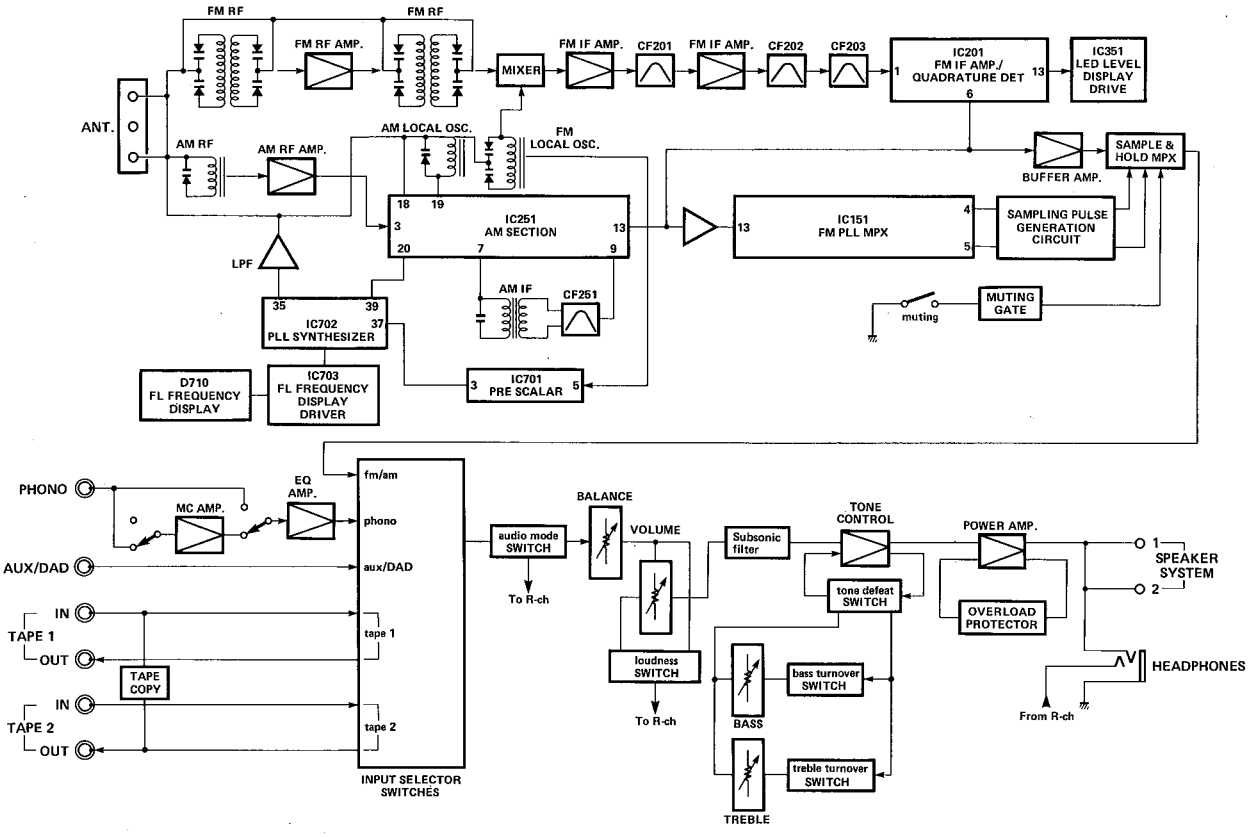
[2] SYNTHESIZER SECTION
1) FM
The output of local oscillator in the front-end is fed to ⑤ pin of the pre-scaler IC701 and then divided by 30 or 32 and fed to ㊲ pin of the PLL synthesizer IC702. The standard quartz oscillator output (4.5MHz) is divided by 180 in IC702 and 25kHz standard signal is got. The divided local oscillator output is compared with the 25kHz standard signal in the phase comparator.
When the divided local oscillator frequency is higher than standard frequency, ㉟ pin of IC702 becomes high level but when it is lower, ㉟ pin of IC702 becomes low level. When the both frequencies are equal, ㉟ pin becomes floating.
㉟ pin output of IC702 is fed to the vari-cap diode of the front-end through L.P.F. (Q702, Q703, Q712) and controls the frequency of VCO (local oscillator frequency).
2) AM
The local oscillator output of AM IC251 is fed to ㊴ pin of the PLL synthesizer IC702 and divided. The standard quartz oscillator output (4.5MHz) is divided by 450 in IC702 and 10kHz standard signal is got. The divided local oscillator output is compared with the 10kHz standard signal in phase comparator.

[3] PRESET MEMORY
1) Memorizing
When one of the preset keys, M1 to M8 is depressed, one of the ⑫ to ⑲ pins of IC702 becomes high level. The displayed frequency is memorized into the memory (RAM) with correspond to the depressed key.
2) Recalling
When one of the preset keys, M1 to M8 is depressed, the contents of the memory (frequency) is recalled.

[4] FM/AM STATION SCANNING
1) When tuning mode switch is set to AUTO
When the UP key is depressed, the frequency rises at saw tooth wave mode and when DOWN key is depressed, the frequency falls. When the high level input is fed to stop terminal (㉝ pin of IC702), the scanning is stopped.
2) When tuning mode switch is set to MANUAL
Whenever UP or DOWN key is depressed once, the frequency rises or falls by one step (channel space).

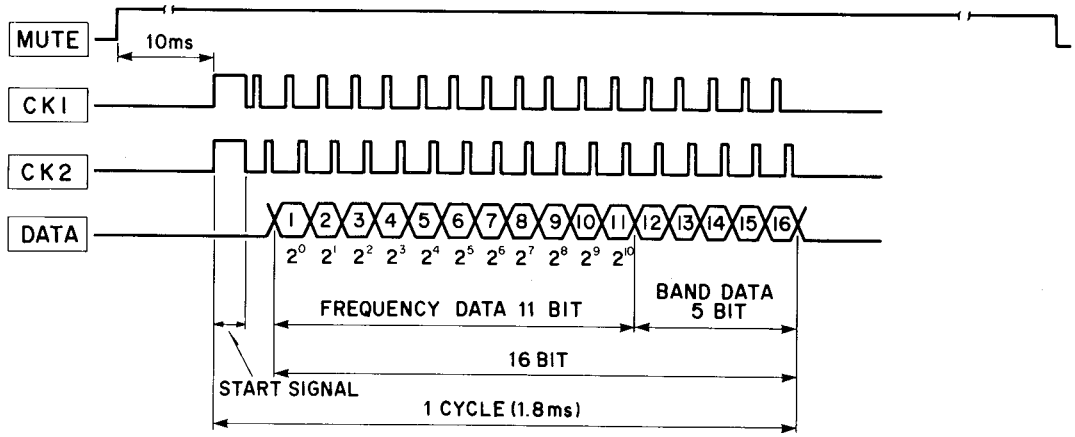
[5] OVERLOAD PROTECTION (LEFT CHANNEL)
As soon as the current over rated power flows, the voltage between both emitters of Q441 and Q443 rises, Q9, Q8 and Q7 are turned to on, Q1 is turned to off. So Q3 (schmit trigger circuit) is tuned to off. The gate of Q401 becomes 0V and Q401 is turned to on. The input to power amp. is cut and Q417 is turned to off. So the operation of pre-driver, driver and power stages stops and the circuit is protected.

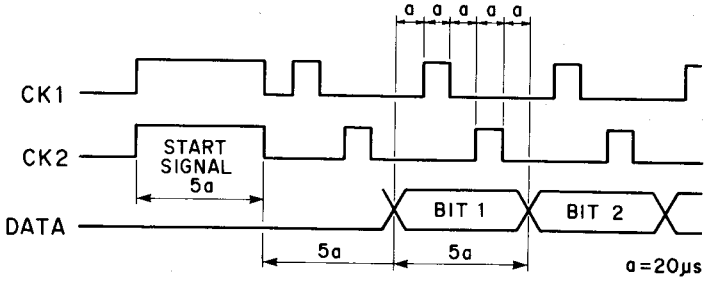
BLOCK DIAGRAM



TIMING CHART

Frequency display timing chart of IC702 (TC9147AP)





GENERAL UNIT PARTS LIST

Ref. No.	Part No.	Description
101	A443-HK690A	Front Panel Assembly
102	A414-HK690A	Cabinet Top Assembly
103	A424-HK690A	Cabinet Bottom Assembly
104	A554-HK690A	Panel Back Assembly
105	A630-HK690A	Knob Assembly, Volume
106	A662-HK690A	Push Button Assembly, Power
107	A662-HK690B	Push Button Assembly, Tape Monitor, Function (x 7)
108	A662-HK690C	Push Button Assembly, Bass Turnover, Tone Defeat, Treble Turnover, Tape Copy, Subsonic Filter, Loudness, MC, Mono Mode, High Blend, Muting (x 10)
109	A662-HK690D	Push Button Assembly, Speakers (x 2)
110	A662-HK690E	Push Button Assembly, Tuning (x 2)
111	B211-HK690A	Chassis Assembly, T1
112	A424-HK690B	Cabinet Back Assembly (for Canada model)
112	1424-11601	Cabinet Back
131	1319-0139	Foot
136	1514-14501	Plate
140	1541-02302	Panel
146	1630-02501	Knob, Bass, Treble, Balance
155	1662-12701	Push Button, Auto, Manual, Memory, FM/AM Preset Memory (x 11)
169	2112-11769	Sponge
170	2114-415027	Bushing
171	2114-71283	Bushing
172	2216-7146	Shield Plate
173	2211-7250	Chassis, Front
175	2211-7253	Chassis, Right
177	2219-7645	Bracket
178	2219-7671	Bracket
179	2219-7879	Bracket
180	2219-7954	Bracket
181	2219-7914	Bracket
182	2219-7955	Bracket
183	2219-7958	Bracket
184	2219-7917	Bracket
185	2219-7919	Bracket
186	2219-7920	Bracket
187	2219-7921	Bracket
188	2219-7946	Bracket
189	2224-7089	Insulator
190	2224-7090	Insulator
191	2112-11755	Sponge
192	2112-11736	Sponge
194	2222-7154	Heat Sink
195	2218-7011	Holding Bracket
196	2218-7001	Holding Bracket
198	2240-7183	Holder
199	2240-7176	Holder
200	2240-7120	Holder
204	2240-7206	Holder
207	2112-11231	Sponge
209	2310-7015	Special Screw
210	2410-7005	Special Washer
212	2224-7069	Insulator

Ref. No.	Part No.	Description
221	2347-300627	Self-Tapping Screw (+) (3 x 6 mm)
223	2347-300627	Self-Tapping Screw (+) (3 x 6 mm)
225	2347-300627	Self-Tapping Screw (+) (3 x 6 mm)
227	2347-300627	Self-Tapping Screw (+) (3 x 6 mm)
229	2347-301041	Self-Tapping Screw (+) (3 x 10 mm)
230	2347-300847	Self-Tapping Screw (+) (3 x 8 mm)
232	2347-301027	Self-Tapping Screw (+) (3 x 10 mm)
234	2347-400647	Self-Tapping Screw (+) (4 x 6 mm)
235	2347-300627	Self-Tapping Screw (+) (3 x 6 mm)
239	2440-7016	Special Nut
241	2440-61	Special Nut
242	2601-7126	Shaft
248	2651-210189	Spring
251	2219-7964	Bracket
252	2219-7953	Bracket
253	2219-7956	Bracket
254	2219-7957	Bracket
255	2219-7959	Bracket
263	2440-7011	Special Nut
302	2222-7081	Heat Sink, PCB-2
307	2446-301Z9	Hexagon Nut
396	2240-7218	Holder, Antenna
	1111-J30162	Owner Guide
	1111-J30163	Owner Guide (for Canada model)
	1222-7264	Packing Cushion, Left
	1222-7265	Packing Cushion, Right
	1221-737167	Packing Box

ELECTRICAL PARTS LIST

Ref. No.	Part No.	Description
	CHASSIS MISCELLANEOUS	
⚠P1	4161-71151	Power Cord
⚠T1	5584-701452	Power Transformer
⚠SO1	4474-156	AC Outlet, Switched, Unswitched
⚠R1	5135-335J50P	Resistor, 3.3MΩ, ±5%, 1/2W, Carbon
L253	5911-239	AM Loop Antenna
J302	4163-043003	Connector with Lead Wire, 4 Pos.
J303	4163-033503	Connector with Lead Wire, 3 Pos.
LUG1	4211-4	Lug Terminal
LUG2	4211-21	Lug Terminal
	1397-6	Dipole Antenna (Accessory)
	4442-14	Pin Plug (for Tape 1 IN Jacks) (Accessory)
	PCB-1 POWER OUTPUT P.C. BOARD	
	RESISTORS	
R423, 424	5174-621381	620Ω, ±1%, 1/4W, Metal
R425, 426	5174-330381	33Ω, ±1%, 1/4W, Metal
R433, 434	5174-243381	24kΩ, ±1%, 1/4W, Metal
⚠R443, 444, 445, 446, 451, 452, 453, 454	5102-1514713	150Ω, ±2%, 1/4W, Fuse
R447, 448, 449, 450	5174-123381	12kΩ, ±1%, 1/4W, Metal
R459, 460	5174-131381	130Ω, ±1%, 1/4W, Metal
⚠R461, 462, 463, 464	5102-2205711	22Ω, ±5%, 1W, Fuse
⚠R465, 466, 467, 468	5102-1014713	100Ω, ±2%, 1/4W, Fuse
⚠R469, 470, 471, 472	5102-2R2579	2.2Ω, ±5%, 1/4W, Fuse
R483/485, 484/486	5275-R22671	0.22Ω, ±10%, 5Wx2, Cement
R487, 488	5175-150571	15Ω, ±5%, 3W, Metal
R489, 490	5171-220572	22Ω, ±5%, 1W, Metal
R491, 492	5171-1R5572	1.5Ω, ±5%, 1W, Metal
R731 ~ 737, 738 ~ 744, 745 ~ 751	5212-3	Resistor Composite, 47kΩ
	CONTROLS	
VR401, 402	5101-50301923	50kΩ
VR403, 404	5101-20101923	200Ω
	CAPACITORS	
C2, 3, 4, 5	5352-1041957	0.1μF, ±10%, 250V, Metalized Polyester
⚠C6, 7, 8, 9	5341-478F0955	4700μF, ±20%, 50V, Electrolytic
C10	5345-475F0952	4.7μF, ±20%, 50V, Electrolytic
C11	5345-336B0952	33μF, ±20%, 10V, Electrolytic
C15	5353-330534	33pF, ±5%, 500V, Mica
C401, 402	5345-107B0951	100μF, ±20%, 10V, Electrolytic
C403, 404	5359-4715851	470pF, ±5%, 100V, Polypropylene
C405, 406	5345-476D041	47μF, ±20%, 25V, Electrolytic
C407, 408	5353-020934	2pF, ±0.5pF, 500V, Mica
C409, 410	5353-680534	68pF, ±5%, 500V, Mica
C411, 412, 417, 418	5345-106C041	10μF, ±20%, 16V, Electrolytic
⚠C413, 414, 415, 416	5345-228F0962	2200μF, ±20%, 50V, Electrolytic
	TRANSISTORS	
Q1, 3	5613-2603(E)	2SC2603(E) or 2SC2603(F)
Q2, 4, 7	5611-1115(E)	2SA1115(E) or 2SA1115(F)
Q8, 403, 404, 405, 406, 413, 414, 419, 420	5613-2240(BL)	2SC2240(BL)
Q9, 10, 411, 412, 415, 416, 417, 418	5611-970(BL)	2SA970(BL)
Q401, 402	5616-2SK364(V)	F.E.T., 2SK364(V) or 2SK364(BL)
Q407, 408, 409, 410	5613-2603(F)	2SC2603(F) or 2SC2603(E)
Q421, 422, 425, 426	5612-646A(C)	2SB646A(C)
Q423, 424, 427, 428	5614-666A(C)	2SD666A(C)
Q429, 430	5613-945(K)	2SC945(K)
Q433, 434	5614-667A(C)	2SD667A(C)
Q435, 436	5612-647A(C)	2SB647A(C)
Q437, 438	5611-1111(Q)	2SA1111(Q), 2SA1111(R)or2SA1111(S) (w/Insulator & Bushing)

Ref. No.	Part No.	Description
Q439, 440	5613-2591(Q)	2SC2591(Q), 2SC2591(R) or 2SC2591(S) (w/Insulator & Bushing)
Q441, 442	5613-3281(O)	2SC3281(O) or 2SC3281(R) (w/Insulator)
Q443, 444	5611-1302(O)	2SA1302(O) or 2SA1302(R) (w/Insulator)
	DIODES	
⚠D1, 2	5685-D5FB20F1	Bridge Silicon, D5FB20
D3	5636-1S2471	1S2471
D4	5635-RD5R6EB2	Zener, RD5.6EB2
D5, 401, 402	5631-1S2473	1S2473
D403, 404	5635-HZ15-1L	Zener, HZ15-1L
D405, 406, 407, 408	5632-10DF2	10DF2
D409, 410	5641-MV12YM	Varistor, MV12YM
	COILS	
L1, 2, 3, 4	5597-35502	Ferrite Bead
L5, 6	5991-7165	
	MISCELLANEOUS	
P401	4443-030185	Connector, 3 Pos.
	PCB-2 TUNER P.C. BOARD	
	RESISTORS	
⚠R71	5102-2205716	22Ω, ±5%, 1W, Fuse
⚠R82	5102-1014715	100Ω, ±2%, 1/4W, Fuse
R158	5174-183381	18kΩ, ±1%, 1/4W, Metal
⚠R159, 268	5102-1004715	10Ω, ±2%, 1/4W, Fuse
⚠R225	5102-3304715	33Ω, ±2%, 1/4W, Fuse
R712	5171-221581	220Ω, ±5%, 1W, Metal
	CONTROLS	
VR151	5101-4727173	4.7kΩ
VR152, 201, 202, 351	5101-50371920	50kΩB
VR301	5101-50271920	5kΩB
VR352	5113-50372136	50kΩ, Mute Adj. (w/Hexagon Nut)
	CAPACITORS	
⚠C72	5345-338D0962	3300μF, ±20%, 25V, Electrolytic
C73, 217	5345-108-16	1000μF, ±20%, 16V, Electrolytic
C74	5345-336-35	33μF, ±20%, 35V, Electrolytic
C151	5345-226C0952	22μF, ±20%, 16V, Electrolytic
C152	5359-2725851	2700pF, ±5%, 100V, Polypropylene
C153	5359-6815851	680pF, ±5%, 100V, Polypropylene
C154, 210, 271, 351, 352, 353, 354	5345-106-16	10μF, ±20%, 16V, Electrolytic
C155	5345-475D0952	4.7μF, ±20%, 25V, Electrolytic
C156, 251, 716, 717	5345-225F0952	2.2μF, ±20%, 50V, Electrolytic
C158, 273	5345-105F0952	1μF, ±20%, 50V, Electrolytic
C159, 160, 209	5359-1015851	100pF, ±5%, 100V, Polypropylene
C161, 164, 166, 260	5359-4715851	470pF, ±5%, 100V, Polypropylene
C162, 167	5359-2215851	220pF, ±5%, 100V, Polypropylene
C163	5359-1515851	150pF, ±5%, 100V, Polypropylene
C165	5359-8215851	820pF, ±5%, 100V, Polypropylene
C168, 169	5345-106C0952	10μF, ±20%, 16V, Electrolytic
C170	5345-227-16	220μF, ±20%, 16V, Electrolytic
C171, 172, 305, 306	5359-1025851	1000pF, ±5%, 100V, Polypropylene
C173	5359-1215851	120pF, ±5%, 100V, Polypropylene
C215	5345-104F0952	0.1μF, ±20%, 50V, Electrolytic
C216	5345-105-50	1μF, ±20%, 50V, Electrolytic
C262	5345-475-25	4.7μF, ±20%, 25V, Electrolytic
C263	5345-335-50	3.3μF, ±20%, 50V, Electrolytic
C265	5345-225-50	2.2μF, ±20%, 50V, Electrolytic
C270	5345-107-16	100μF, ±20%, 16V, Electrolytic
C301, 302, 303, 304	5359-1525851	1500pF, ±5%, 100V, Polypropylene
C307, 308	5345-226C0951	22μF, ±20%, 16V, Electrolytic
C309, 310	5359-7525851	7500pF, ±5%, 100V, Polypropylene

Ref. No.	Part No.	Description
C311, 312	5345-225F0951	2.2μF, ±20%, 50V, Electrolytic
C315, 316	5359-3025851	3000pF, ±5%, 100V, Polypropylene
C355	5345-226-16	22μF, ±20%, 16V, Electrolytic
C703	5345-476-10	47μF, ±20%, 10V, Electrolytic
C709	5345-334F0951	0.33μF, ±20%, 50V, Electrolytic
C711	5343-2260653	22μF, ±20%, 6.3V, Tantalum Electrolytic
C712	5350-4730H651	0.047μF, +80% −20%, 5V, Special
C715	5345-227-10	220μF, ±20%, 10V, Electrolytic
TC251, 252	5371-93	Trimmer Capacitor
	INTEGRATED CIRCUITS	
IC151	5652-BA1330	BA1330
IC152	5654-TC4049BP	TC4049BP
IC153	5654-TC4066BP	TC4066BP
IC201	5652-HA11225	HA11225
IC251	5652-LA1245	LA1245
IC351	5652-AN6875	AN6875
IC352	5654-TC4011BP	TC4011BP
IC701	5654-TD6104P	TD6104P
IC702	5654-TC9147AP	TC9147AP
IC703	5654-TD6301AP	TD6301AP
	TRANSISTORS	
Q71	5612-834(GR)	2SB834(GR)
Q72, 151, 152, 153, 155, 157, 159, 205, 252, 307, 308, 309, 310, 352, 355, 357, 359, 704, 705, 706, 708, 709, 710, 711	5613-2603(F)	2SC2603(F) or 2SC2603(E)
Q73	5611-965(O)	2SA965(O) or 2SA965(Y)
Q74, 75, 76, 154, 156, 158, 303, 304, 305, 306, 351, 353, 354, 356, 358, 360, 707, 712	5611-1115(F)	2SA1115(F) or 2SA1115(E)
Q201, 202, 203, 204	5613-2058(N)	2SC2058(N) or 2SC2058(P)
Q251	5616-2SK241(Y)	F.E.T., 2SK241(Y) or 2SK241(GR1)
Q301, 302	5616-2SK381(D)	F.E.T., 2SK381(D)
Q311, 312	5615-2SJ103(G)	F.E.T., 2SJ103(G)
Q361, 362	5613-2878(B)	2SC2878(B)
Q702	5616-2SK117(Y)	F.E.T., 2SK117(Y)
Q703	5613-2320L(F)	2SC2320L(F) or 2SC2320L(G)
	DIODES	
⚠D71	5685-1F	Bridge Silicon, SIRBA10
D72, 151, 152, 153, 201, 202, 351, 352, 361, 362, 702, 703, 704, 705, 706, 722, 723	5631-1S2473	1S2473
D73, 74	5635-HZ7B2L	Zener, HZ7B2L
D75	5635-HZ27-3L	Zener, HZ27-3L
D251, 252	5633-1SV102	1SV102
D354/355/356/357/358/359/360	5623-LS007S	LED Display, Signal Strength, Tuned, Stereo
D707	5635-RD5R6EB2	Zener, RD5.6EB2
D708	5635-RD10EB1	Zener, RD10EB1
D709	5635-RD8R2EB1	Zener, RD8.2EB1
	COILS	
L101	5995-704027	
L102, 201, 702	5995-2R2269	
L251	5933-70128	
L252	5923-70133	
	TRANSFORMERS	
⚠T71	5584-701345	
T201	5574-7024	

Ref. No.	Part No.	Description
T251	5552-70113	
T252	5932-70123	
	MISCELLANEOUS	
	6114-7130	FM Tuner Assembly
	5722-10	Station Display, FIP7B85
X701	5691-00720019	Crystal Osc.
CF201, 202, 203	5671-7119A	Ceramic Filter, SFE10.7ML
CF251	5671-7139G	Ceramic Filter, SFP450G
CF252	5671-7137C	Ceramic Filter
TE1	4214-144	External Antenna Terminals
P301	4443-070185	Connector, 7 Pos.
P302	4443-047114	Connector, 4 Pos.
P303	4443-037114	Connector, 3 Pos.
P351	4443-167114	Connector, 16 Pos.
P352	4443-030185	Connector, 3 Pos.
P353	4443-050185	Connector, 5 Pos.
	PCB-3 PHONO EQUALIZER P.C. BOARD	
	RESISTORS	
R621, 622	5174-Z634038	634Ω, ±1%, 1/4W, Metal
R627, 628	5174-102381	1kΩ, ±1%, 1/4W, Metal
R645, 646	5174-Z549338	549kΩ, ±1%, 1/4W, Metal
R647, 648	5174-Z412238	41.2kΩ, ±1%, 1/4W, Metal
⚠R657, 658	5102-2704715	27Ω, ±2%, 1/4W, Fuse
R661, 662	5174-Z169338	169kΩ, ±1%, 1/4W, Metal
	CAPACITORS	
C601, 602	5345-476B0951	47μF, ±20%, 10V, Electrolytic
C603, 604	5359-1215851	120pF, ±5%, 100V, Polypropylene
C605, 606	5359-1015851	100pF, ±5%, 100V, Polypropylene
C607, 608	5345-477B0952	470μF, ±20%, 10V, Electrolytic
C609, 610	5345-226C041	22μF, ±20%, 16V, Electrolytic
C617, 618, 619, 620,	5359-2025851	2000pF, ±5%, 100V, Polypropylene
C621, 622, 623, 624	5345-226D0226	22μF, ±20%, 25V, Electrolytic
⚠C625, 626	5345-477D041	470μF, ±20%, 25V, Electrolytic
C627, 628	5345-107D041	100μF, ±20%, 25V, Electrolytic
C805	5345-105F0952	1μF, ±20%, 50V, Electrolytic
⚠C809	5345-338D0962	3300μF, ±20%, 25V, Electrolytic
C810	5345-106C041	10μF, ±20%, 16V, Electrolytic
C907, 908	5345-107C041	100μF, ±20%, 16V, Electrolytic
	TRANSISTORS	
Q601, 602, 603, 604, 611, 612	5613-2240(BL)	2SC2240(BL)
Q605, 606, 607, 608, 803, 805, 910	5613-2603(E)	2SC2603(E) or 2SC2603(F)
Q609, 610, 613, 614	5611-970(BL)	2SA970(BL)
Q615, 616	5612-646(C)	2SB646(C)
Q617, 618	5614-666(C)	2SD666(C)
Q619, 620	5614-667(C)	2SD667(C)
Q621, 622	5612-647(C)	2SB647(C)
Q623	5614-669(C)	2SD669(C) (w/Insulator)
Q624	5612-649(C)	2SB649(C) (w/Insulator)
Q801, 802, 804, 806, 813, 814, 815, 909	5611-1115(E)	2SA1115(E) or 2SA1115(F)
Q807, 808	5612-1034	2SB1034
Q811, 812	5616-2SK364(V)	F.E.T., 2SK364(V) or 2SK364(BL)
	DIODES	
D601, 602, 803, 804, 805, 806, 807	5631-1S2473	1S2473
D603, 604	5641-MV103	Varistor, MV103
D605, 606	5635-HZ24-1L	Zener, HZ24-1L
D808, 901, 902	5635-RD3R0EB1	Zener, RD3.0EB1

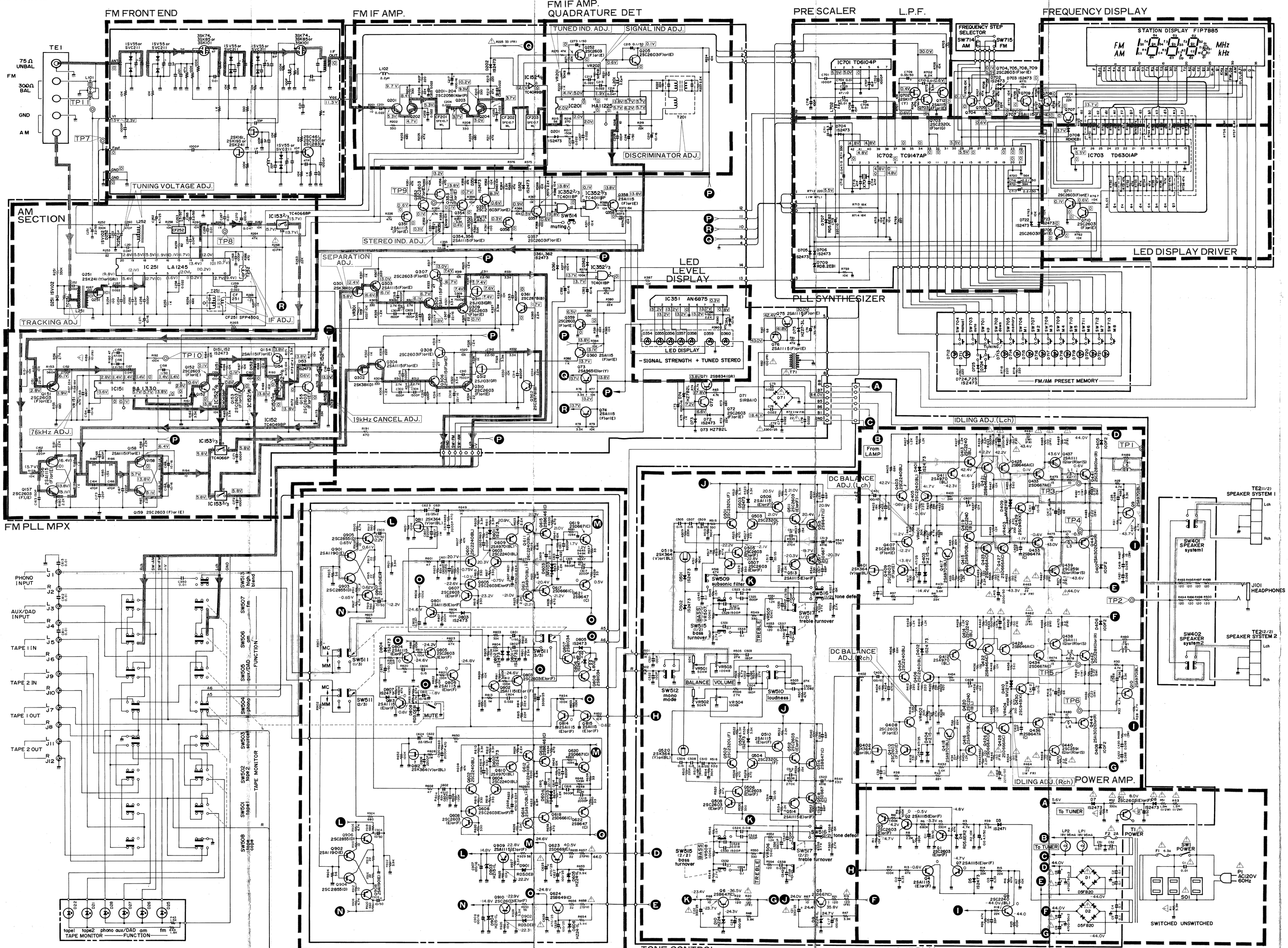
Ref. No.	Part No.	Description
	MISCELLANEOUS	
L801/802	4331-40207215	Relay, DC
J1/2/3/4/5/6, 7/8/9/10/11/12	4486-9	6-Pin Jack, Phono, Aux/DAD, Tape 1, Tape 2
P601, 602	4443-040185	Connector, 4 Pos.
P603	4443-030185	Connector, 3 Pos.
P604	4443-050185	Connector, 5 Pos.
P605, 801	4443-070185	Connector, 7 Pos.
	PCB-4 MC AMP. P.C. BOARD	
	RESISTORS	
R917, 918, 919, 920	5174-561381	560Ω, ±1%, 1/4W, Metal
	CAPACITORS	
C903, 904, 905, 906	5345-106F0226	10μF, ±20%, 50V, Electrolytic
	TRANSISTORS	
Q901, 902, 907, 908	5611-1190(E)	2SA1190(E)
Q903, 904, 905, 906	5613-2855(D)	2SC2855(D)
	DIODES	
D903, 904	5635-HZ15-1L	Zener, HZ15-1L
	MISCELLANEOUS	
P802	4443-09418	Connector, 9 Pos.
	PCB-5 TONE CONTROL P.C. BOARD	
	RESISTORS	
⚠R19, 20	5102-1214715	120Ω, ±2%, 1/4W, Fuse
	CONTROLS	
VR501/502	5113-50385122	50kΩ MN, Balance (w/Hexagon Nut)
VR505/506	5113-50371148	50kΩC, Treble (w/Hexagon Nut)
VR507/508	5113-10472148	100kΩC, Bass (w/Hexagon Nut)
	CAPACITORS	
C17, 18	5345-107D041	100μF, ±20%, 25V, Electrolytic
⚠C21, 22	5345-337D041	330μF, ±20%, 25V, Electrolytic
C509, 510	5345-685D0951	6.8μF, ±20%, 25V, Electrolytic
C511, 512	5353-010934	1pF, ±0.5pF, 500V, Mica
C513, 514	5345-226D0951	22μF, ±20%, 25V, Electrolytic
C515, 516, 517, 518	5353-680534	68pF, ±5%, 500V, Mica
C519, 520	5345-476C0951	47μF, ±20%, 16V, Electrolytic
C521, 522	5359-1015851	100pF, ±5%, 100V, Polypropylene
	TRANSISTORS	
Q5, 517, 518	5614-667(C)	2SD667(C)
Q6, 515, 516	5612-647(C)	2SB647(C)
Q501, 502, 503, 504	5613-2320L(F)	2SC2320L(F)
Q505, 506, 507, 508, 511, 512	5613-2603(E)	2SC2603(E) or 2SC2603(F)
Q509, 510, 513, 514	5611-1115(E)	2SA1115(E) or 2SA1115(F)
Q519, 520	5616-2SK364(V)	F.E.T., 2SK364(V) or 2SK364(BL)
	DIODES	
D9, 10	5635-HZ24-1L	Zener, HZ24-1L
D501, 502, 503, 504	5631-1S2473	1S2473
	MISCELLANEOUS	
SW501/502/503/504/505/506/507	4431-0728724	Push Switch, Tape Monitor, Function
P501	4443-030185	Connector, 3 Pos.

Ref. No.	Part No.	Description
	PCB-6 TUNING SWITCHES P.C. BOARD	
	DIODES	
D711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721	5637-GL5NG6	L.E.D., GL5NG6, Green, Auto, Manual, Memory, FM/AM Preset Memory
D724, 725	5631-1S2473	1S2473
	MISCELLANEOUS	
SW701, 702	4431-A020145	Push Switch, Tuning
SW703/704/705	4431-03037155	Push Switch, Auto, Manual, Memory
SW706/707/708/709, 710/711/712/713	4431-04047165	Push Switch, FM/AM Preset Memory
J351	4163-70896	Connector with Lead Wire, 16 Pos.
	PCB-7 PUSH SWITCHES P.C. BOARD	
	CAPACITORS	
C503, 504	5359-1815851	180pF, ±5%, 100V, Polypropylene
C801, 802	5345-105F0952	1μF, ±20%, 50V, Electrolytic
	DIODES	
D801, 802	5631-1S2473	1S2473
	MISCELLANEOUS	
SW508/509/510	4431-03127353	Push Switch, Tape Copy, Subsonic Filter, Loudness
SW511/512/513/514	4431-04127167	Push Switch, MC, Mono Mode, High Blend, Muting
	PCB-8 TONE SWITCHES P.C. BOARD	
SW515/516/517	4431-03127253	Push Switch, Bass Turnover, Tone Defeat, Treble Turnover
	PCB-9 VOLUME CONTROL P.C. BOARD	
VR503/504	5113-10471147	Control, 100kΩB, Volume (w/Hexagon Nut)
	PCB-10 TAPE MONITOR & FUNCTION INDICATORS P.C. BOARD	
D21, 22	5637-GL5PR6	L.E.D., GL5PR6, Red, Tape Monitor
D25, 26, 27, 28	5637-GL5NG6	L.E.D., GL5NG6, Green, Function
	PCB-11 SPEAKER SWITCHES P.C. BOARD	
SW401/402	4431-02087266	Push Switch, Speakers 1/2
P451	4443-030185	Connector, 3 Pos.
	PCB-12 SPEAKER TERMINAL P.C. BOARD	
TE2	4214-121	Terminal, Speaker System 1/2
	PCB-13 POWER SWITCH P.C. BOARD	
	RESISTORS	
⚠R50	5134-105J25P	1MΩ, ±5%, 1/4W, Carbon
⚠R51, 53	5135-155J50P	1.5MΩ, ±5%, 1/2W, Carbon
⚠R52	5134-334J25P	330kΩ, ±5%, 1/4W, Carbon
	CAPACITORS	
⚠C1	5352-1030959	0.01μF, ±20%, AC125V, Metalized Polyester
⚠C50	5345-105F041	1μF, ±20%, 50V, Electrolytic
	TRANSISTOR	
⚠Q11	5613-2603(E)	2SC2603(E) or 2SC2603(F)
	DIODES	
⚠D7, 8	5631-1S2473	1S2473

Ref. No.	Part No.	Description
	MISCELLANEOUS	
⚠SW1	4431-A01716	Push Switch, Power
⚠F1	5732-632029	Fuse, 6.3A, 125V
⚠F2	5732-202031	Fuse, 2A, 125V
	4472-7113	Fuse Holder, F1 (x 2)
	4472-7122	Fuse Holder, F2 (x 2)
	PCB-14 HEADPHONE JACK P.C. BOARD	
J101	4451-00139	Jack, Headphones
	PCB-15 LAMP P.C. BOARDS	
LP1, 2	5731-1807163	Lamp, 18V 95mA
	PCB-16 FREQUENCY STEP SELECTOR P.C. BOARD	
SW714, 715	4421-012413	Slide Switch, AM 9 kHz/10 kHz, FM 50 kHz/100 kHz

⚠ SAFETY-REQUIREMENTS COMPONENTS IN ACCORDANCE WITH PRESENT SAFETY REGULATIONS, THESE COMPONENTS MUST ONLY BE REPLACED BY ORIGINAL PARTS.

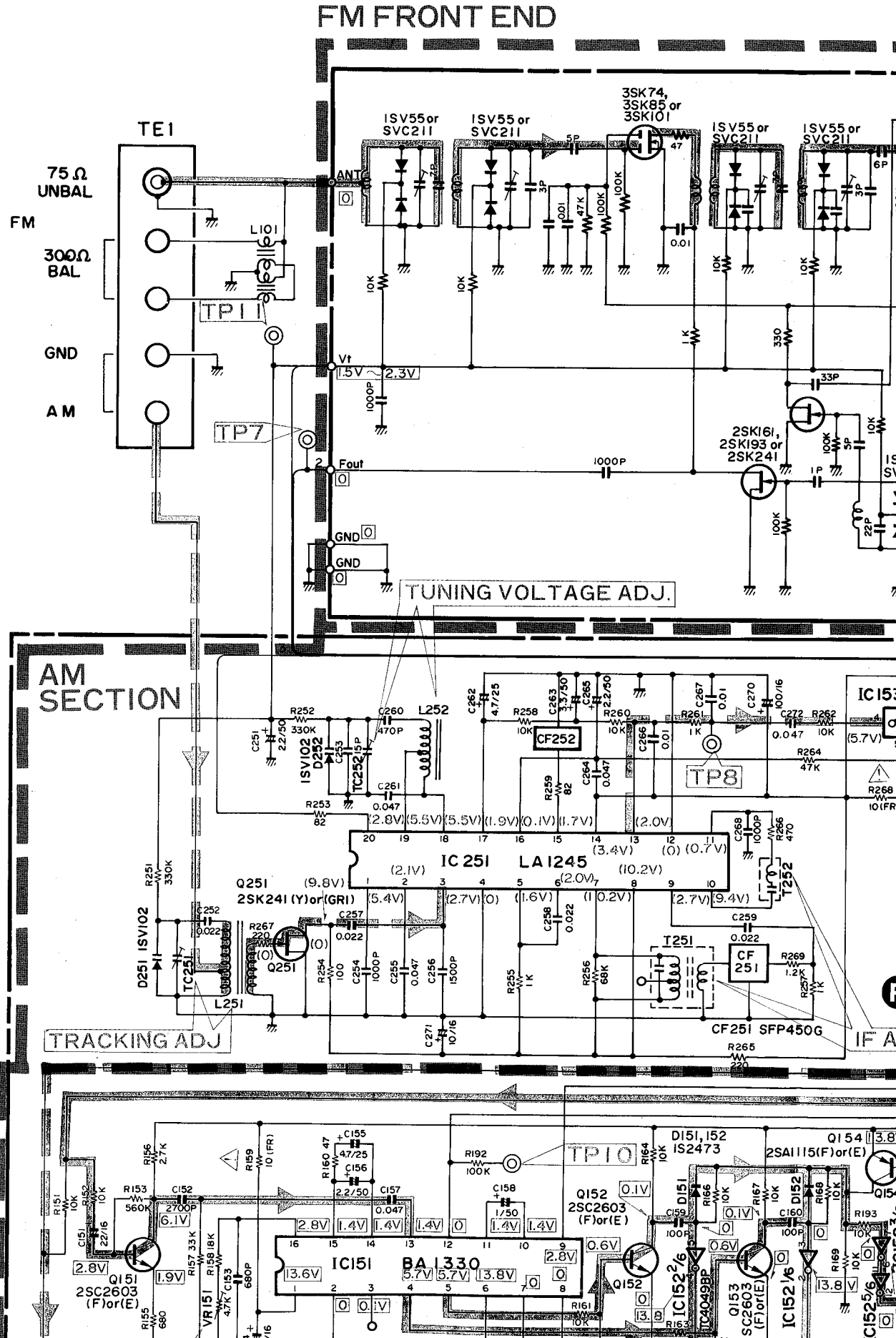
SCHEMATIC DIAGRAM

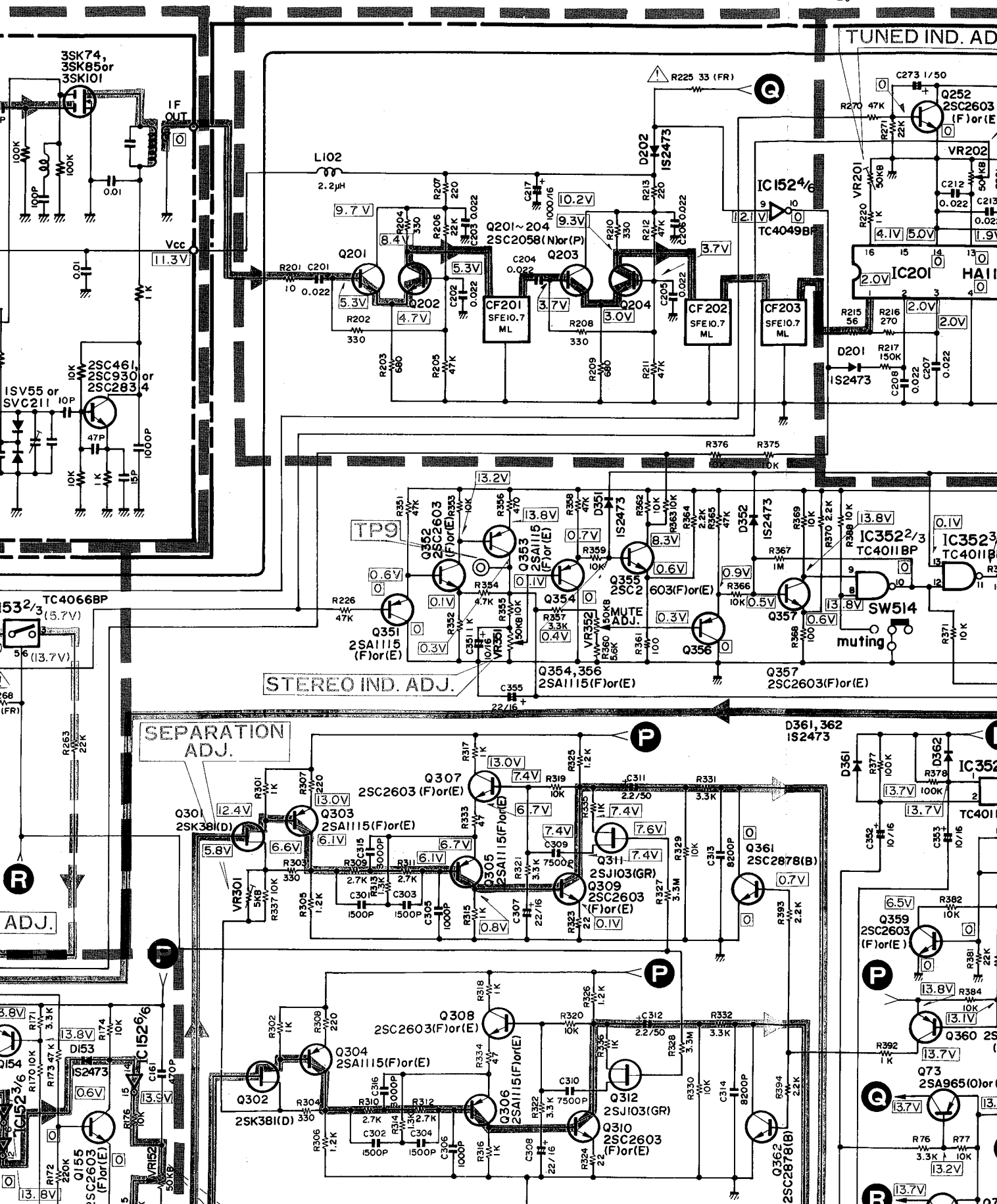


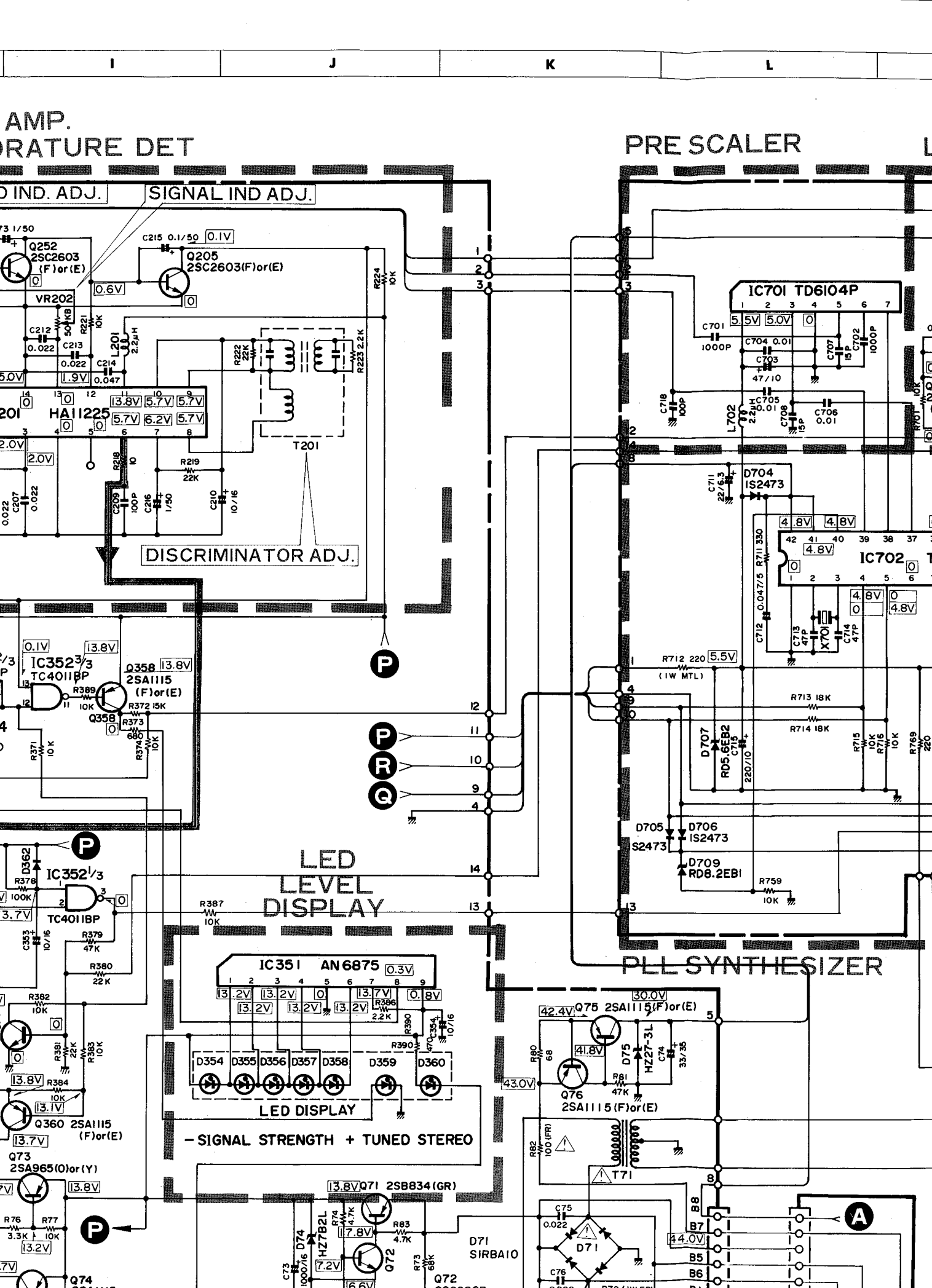
. . . . . FM SIGNAL
. . . . . AM SIGNAL
. . . . . PHONO SIGNAL

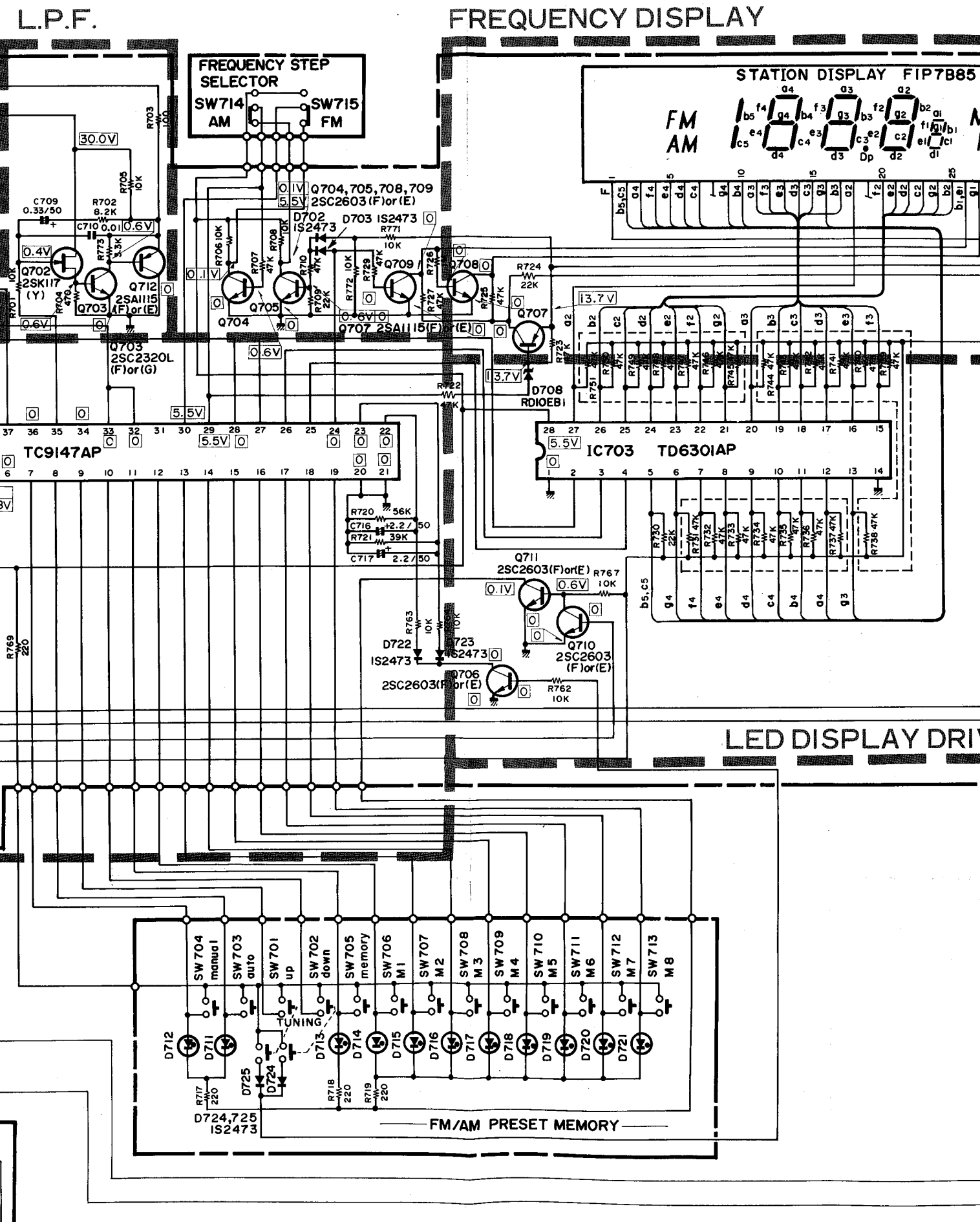
1. ALL RESISTANCES VALUES ARE IN Ω. KΩ=1000Ω, MΩ=1000KΩ.
2. THE WATTAGE OF RESISTORS IS 1/4W UNLESS OTHERWISE NOTED.
3. ALL CAPACITANCES VALUES ARE IN μF UNLESS OTHERWISE NOTED. P=μμF
4. V: DC VOLTAGE AT NO SIGNAL
   (V) FM POSITION
   ( ) V: AM POSITION
5. ⚠ SAFETY-REQUIREMENTS COMPONENTS IN ACCORDANCE WITH PRESENT SAFETY REGULATIONS. THESE COMPONENTS MUST ONLY BE REPLACED BY ORIGINAL PARTS.

SCHEMATIC DIAGRAM

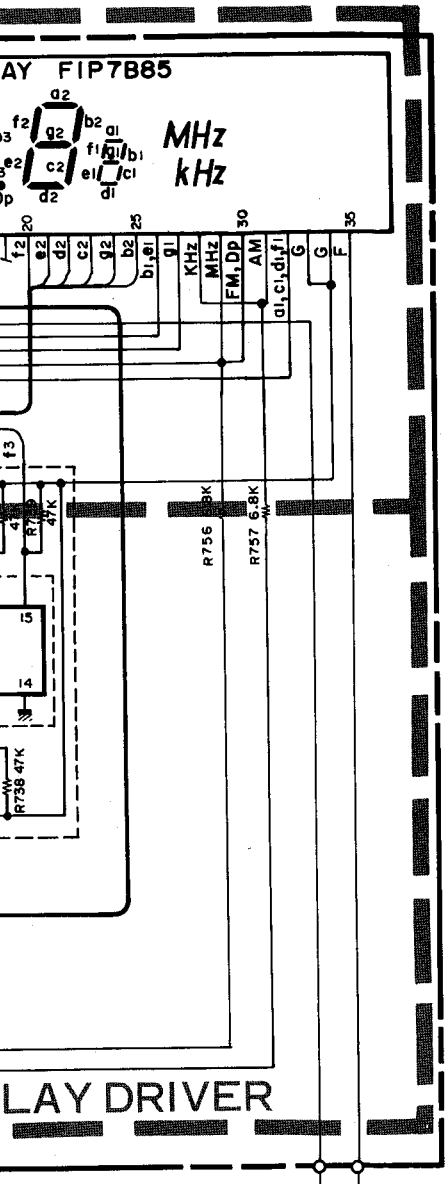



FM IF AMP.
FM IF AMP.
QUADRATU
TUNED IND. AD
3SK74,
3SK85or
3SK101
IF
OUT
Vcc
11.3V
L102
2.2μH
R225 33 (FR)
D202
IS2473
Q201~204
2SC2058(N)or(P)
Q201
Q202
Q203
Q204
CF201
SFE10.7
ML
CF202
SFE10.7
ML
CF203
SFE10.7
ML
IC1524/6
TC4049BP
Q252
2SC2603
(F)or(E
VR202
VR201
IC201
HA11
D201
IS2473
2SC461,
2SC930or
2SC2834
ISV55 or
SVC211
TC4066BP
TP9
Q352
2SC2603
(F)or(E)
Q353
2SA1115
(F)or(E)
Q354
Q355
2SC2603(F)or(E)
Q351
2SA1115
(F)or(E)
MUTE
ADJ.
Q356
Q357
2SC2603(F)or(E)
IC352
TC4011BP
SW514
muting
STEREO IND. ADJ.
Q354,356
2SA1115(F)or(E)
SEPARATION
ADJ.
Q301
2SK381(D)
Q303
2SA1115(F)or(E)
Q307
2SC2603 (F)or(E)
Q305
2SA1115(F)or(E)
Q309
2SC2603
(F)or(E)
Q311
2SJ103(GR)
Q361
2SC2878(B)
D361,362
IS2473
Q302
2SK381(D)
Q304
2SA1115(F)or(E)
Q308
2SC2603(F)or(E)
Q306
2SA1115(F)or(E)
Q310
2SC2603
(F)or(E)
Q312
2SJ103(GR)
Q362
2SC2878(B)
Q359
2SC2603
(F)or(E)
Q360
Q73
2SA965(O)or
IC1526
IC1523
D153
IS2473
Q154
Q155
2SC2603
(F)or(E)

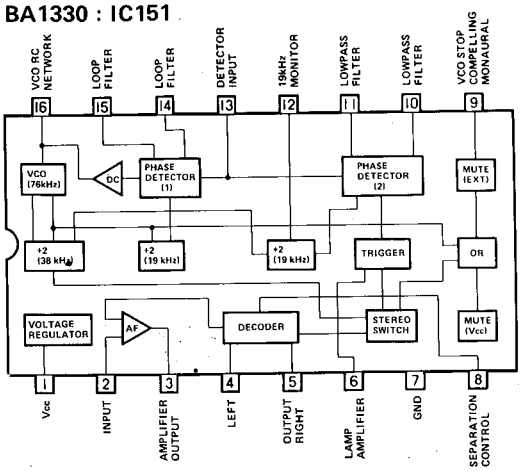

AMP.
ORATURE DET
PRE SCALER
IND. ADJ.
SIGNAL IND ADJ.
Q252 2SC2603 (F)or(E)
Q205 2SC2603(F)or(E)
VR202
HA11225
T201
DISCRIMINATOR ADJ.
IC701 TD6104P
D704 IS2473
IC702
X701
D707 RD5.6EB2
D705 S2473
D706 IS2473
D709 RD8.2EB1
LED LEVEL DISPLAY
IC351 AN6875
LED DISPLAY
- SIGNAL STRENGTH + TUNED STEREO
IC352 1/3
IC352 2/3
IC352 3/3
TC4011BP
Q358 2SA1115 (F)or(E)
Q360 2SA1115 (F)or(E)
Q73 2SA965(O)or(Y)
Q74
Q71 2SB834(GR)
Q72
D71 SIRBAIO
HZ7B2L
PLL SYNTHESIZER
Q75 2SA1115(F)or(E)
Q76 2SA1115(F)or(E)
HZ27-3L
T71
D354 D355 D356 D357 D358 D359 D360
P
R
Q
A


L.P.F.
FREQUENCY DISPLAY
FREQUENCY STEP SELECTOR
SW714 AM
SW715 FM
STATION DISPLAY FIP7B85
FM
AM
Q704,705,708,709 2SC2603(F)or(E)
D702 IS2473
D703 IS2473
Q702 2SK117 (Y)
Q712 2SA1115 (F)or(E)
Q703 2SC2320L (F)or(G)
Q704
Q705
Q707
Q708
Q709
D708 RD10EB1
TC9147AP
IC703 TD6301AP
Q711 2SC2603(F)or(E)
Q710 2SC2603 (F)or(E)
Q706 2SC2603(F)or(E)
D722 IS2473
D723 IS2473
LED DISPLAY DRIV
SW704 manual
SW703 auto
SW701 up
SW702 down
SW705 memory
SW706 M1
SW707 M2
SW708 M3
SW709 M4
SW710 M5
SW711 M6
SW712 M7
SW713 M8
TUNING
D712
D711
D713
D714
D715
D716
D717
D718
D719
D720
D721
D724
D725
D724,725 IS2473
FM/AM PRESET MEMORY

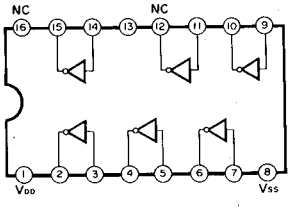
Q	R	S	T



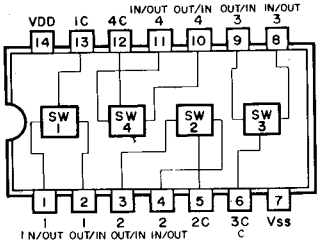
BA1330 : IC151



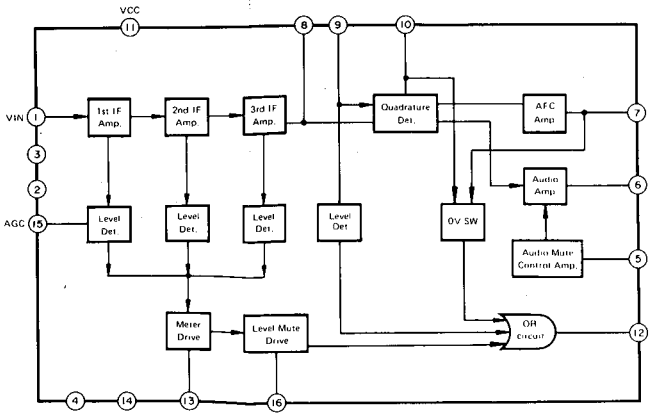
TC4049BP : IC152



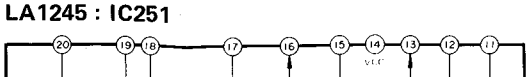
TC4066BP : IC153

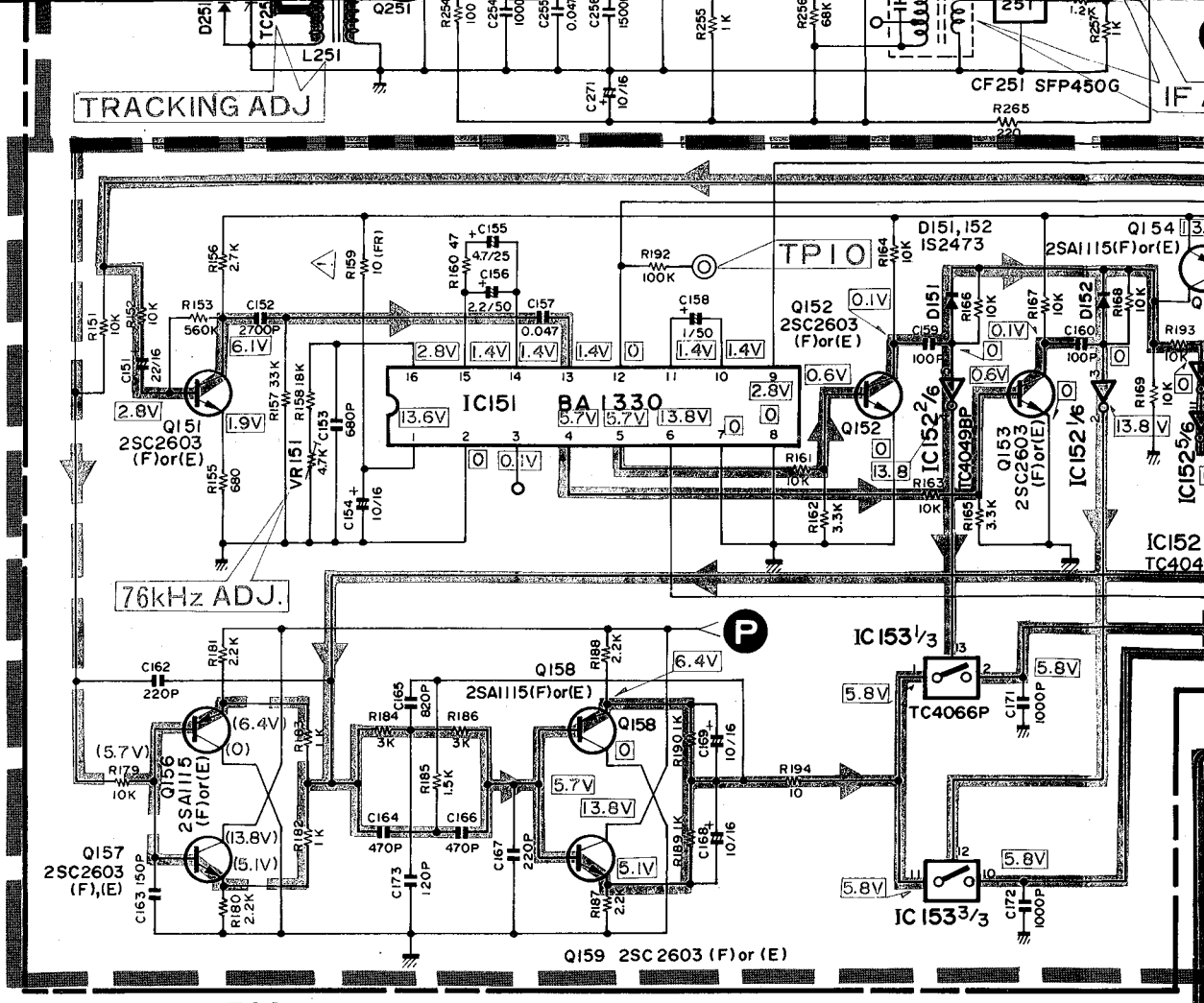


HA11225 : IC201

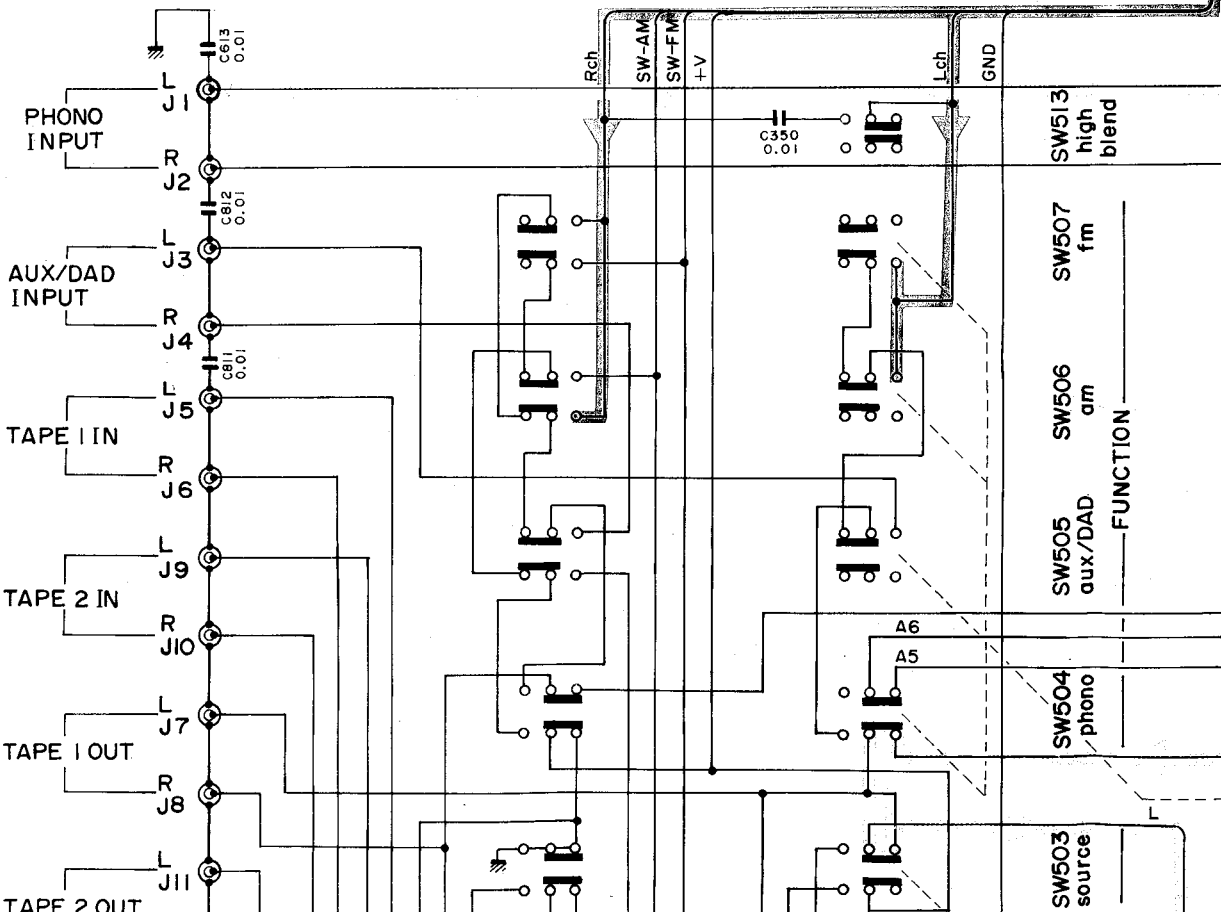


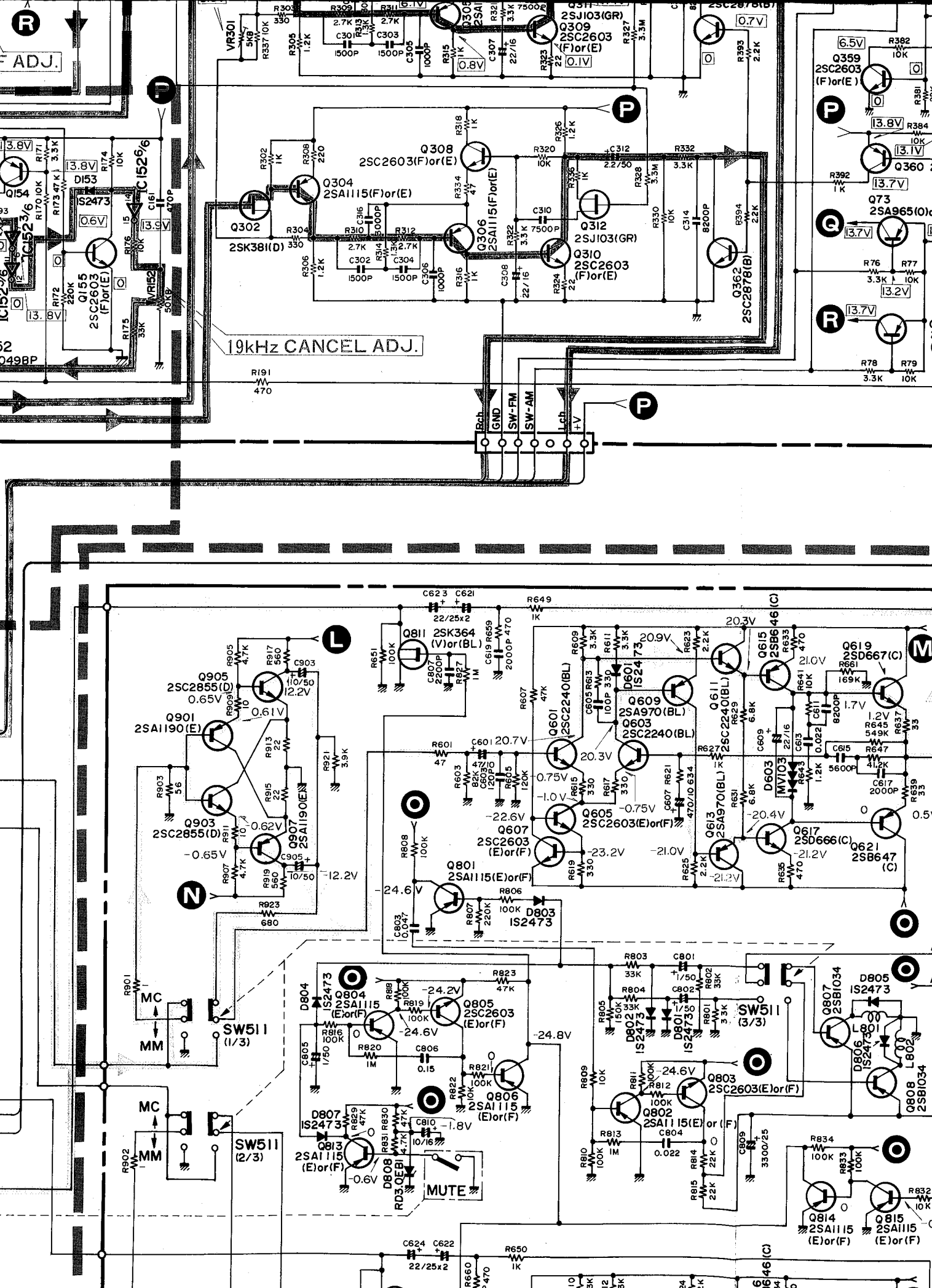
LA1245 : IC251

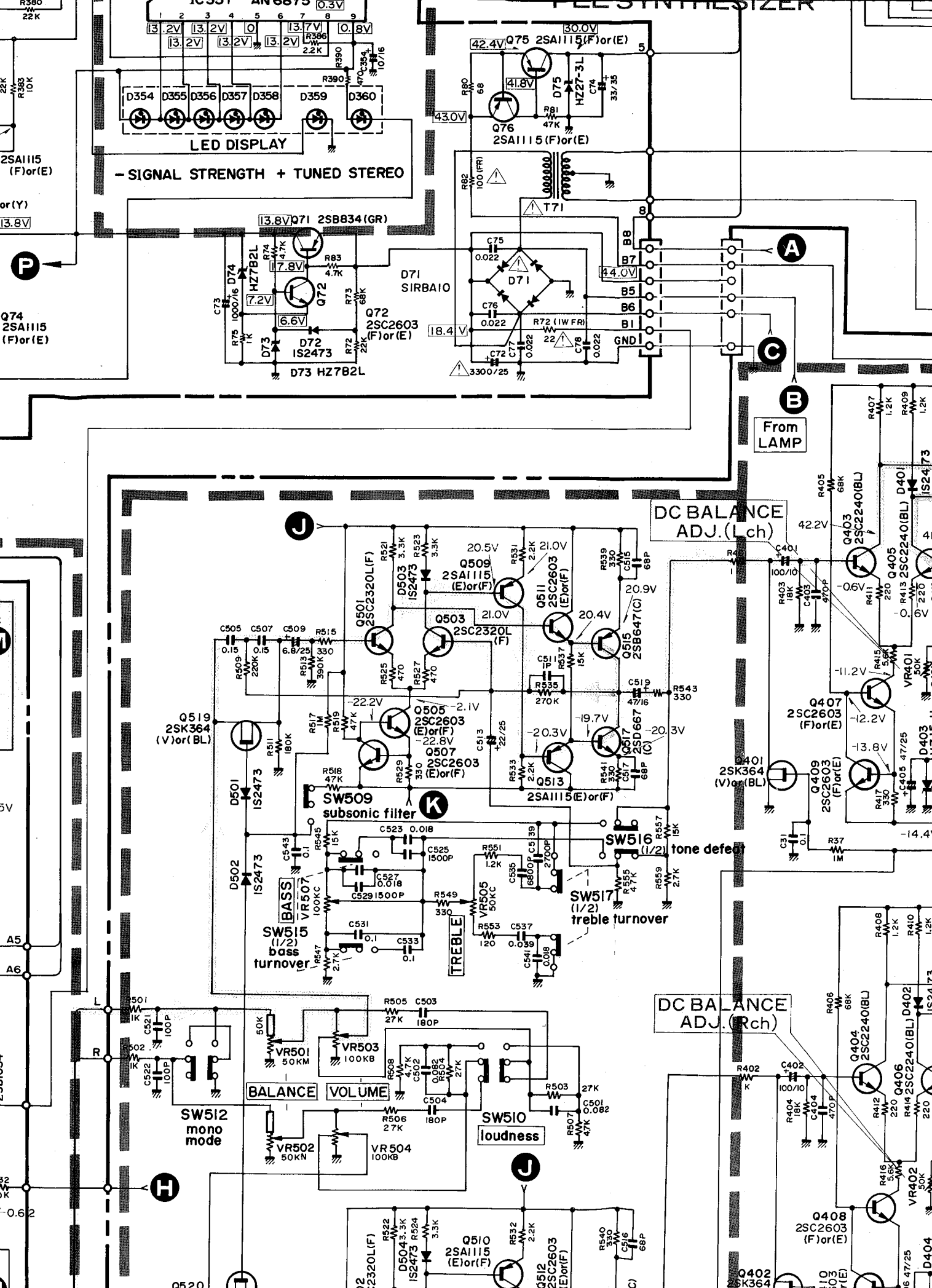


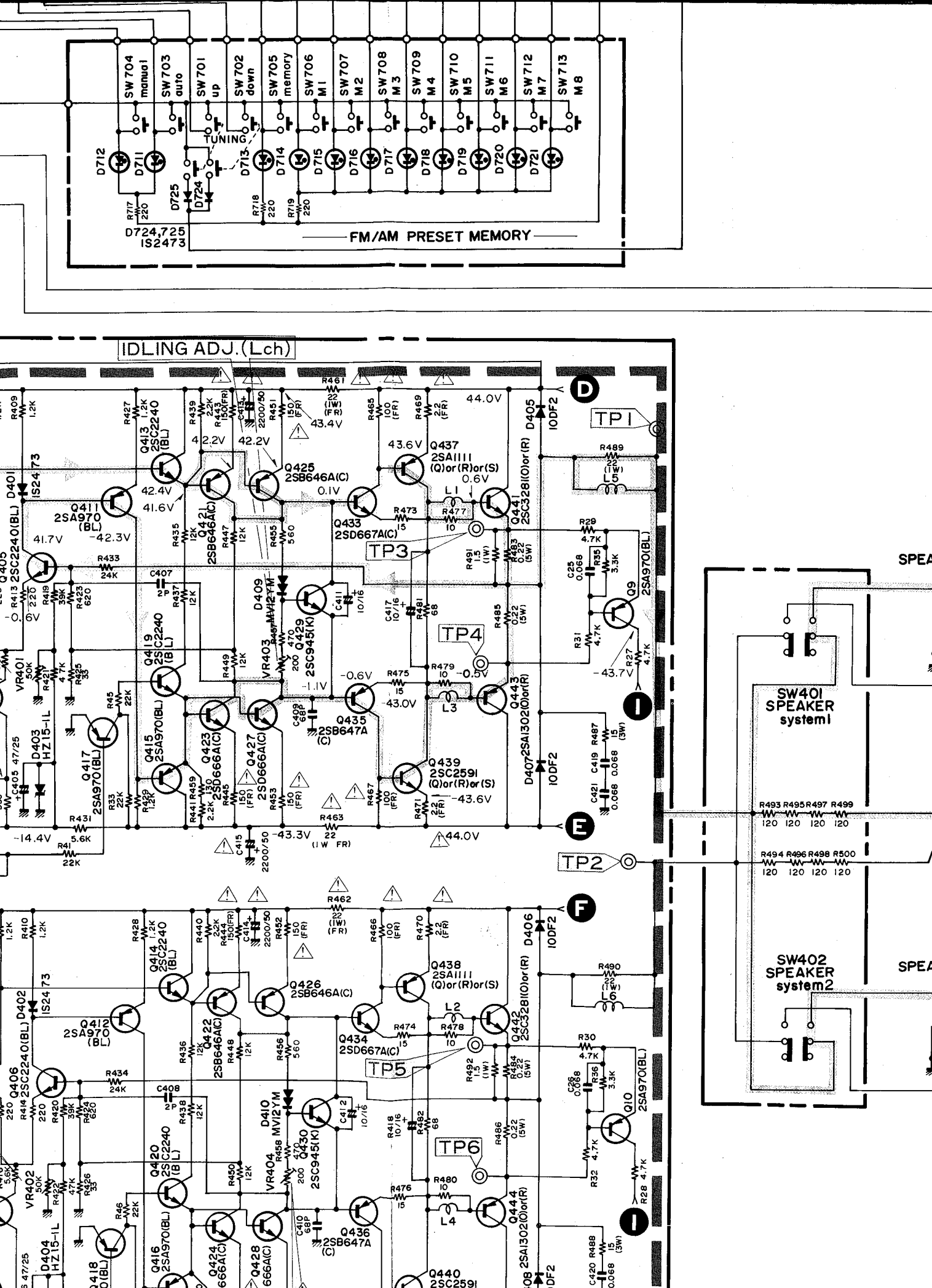

TRACKING ADJ
L251
CF251 SFP450G
IF
TP10
IC151 BA1330
Q151 2SC2603 (F)or(E)
Q152 2SC2603 (F)or(E)
Q153 2SC2603 (F)or(E)
D151,152 1S2473
Q154 2SA1115(F)or(E)
IC152 TC404
76kHz ADJ.
Q156 2SA1115 (F)or(E)
Q157 2SC2603 (F),(E)
Q158 2SA1115(F)or(E)
IC153 1/3
IC153 3/3
TC4066P
Q159 2SC2603 (F)or(E)

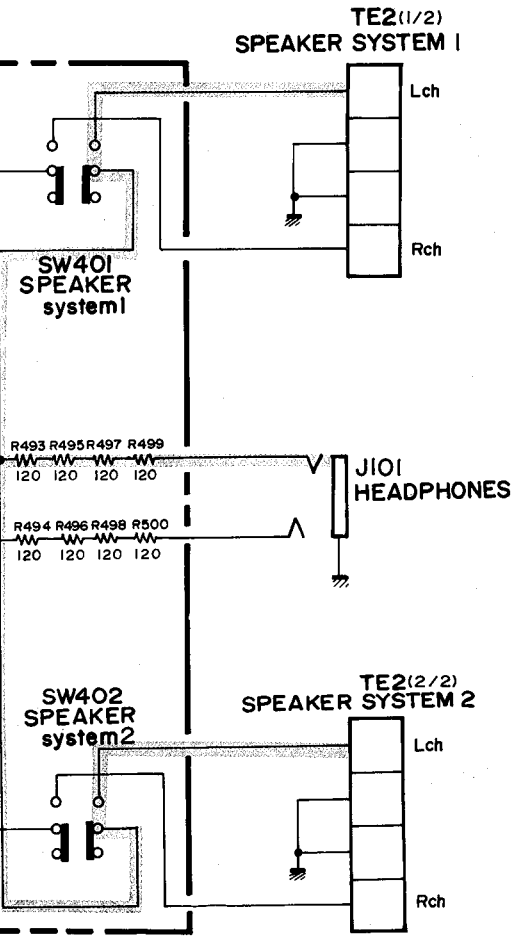
FM PLL MPX

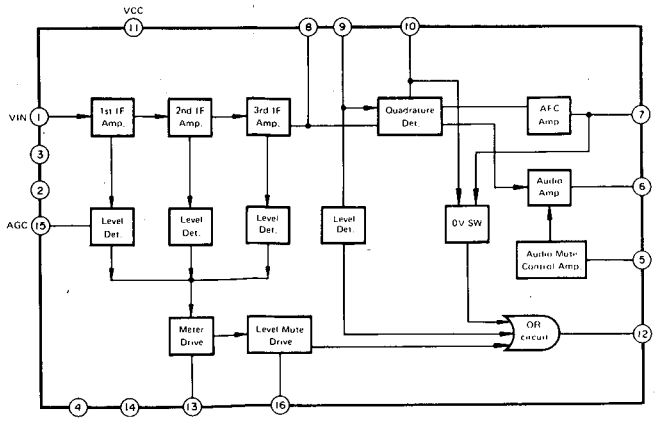

PHONO INPUT
AUX/DAD INPUT
TAPE 1 IN
TAPE 2 IN
TAPE 1 OUT
TAPE 2 OUT
Rch
SW-AM
SW-FM
+V
Lch
GND
SW513 high blend
SW507 fm
SW506 am
SW505 aux/DAD
SW504 phono
SW503 source
FUNCTION


19kHz CANCEL ADJ.
Bch
GND
SW-FM
SW-AM
Lch
+V
Q308
2SC2603(F)or(E)
Q304
2SA1115(F)or(E)
Q302
2SK381(D)
Q306
2SA1115(F)or(E)
Q312
2SJ103(GR)
Q310
2SC2603
(F)or(E)
Q362
2SC2878(B)
Q359
2SC2603
(F)or(E)
Q360
Q73
2SA965(O)
Q154
Q155
2SC2603
(F)or(E)
D153
IS2473
IC152
Q811 2SK364
(V)or(BL)
Q905
2SC2855(D)
Q901
2SA1190(E)
Q903
2SC2855(D)
Q907
2SA1190(E)
Q601
2SC2240(BL)
Q609
2SA970(BL)
Q603
2SC2240(BL)
Q611
2SC2240(BL)
Q615
2SB646(C)
Q619
2SD667(C)
Q605
2SC2603(E)or(F)
Q607
2SC2603
(E)or(F)
Q613
2SA970(BL)
Q617
2SD666(C)
Q621
2SB647
(C)
Q801
2SA1115(E)or(F)
D601
IS2473
D603
MV103
D803
IS2473
SW511
(1/3)
SW511
(2/3)
SW511
(3/3)
MC
MM
Q804
2SA1115
(E)or(F)
Q805
2SC2603
(E)or(F)
Q806
2SA1115
(E)or(F)
Q807
2SB1034
Q808
2SB1034
Q802
2SA1115(E)or(F)
Q803
2SC2603(E)or(F)
Q813
2SA1115
(E)or(F)
D804
IS2473
D805
IS2473
D806
IS2473
D807
IS2473
D808
RD3.0EB1
D802
IS2473
D801
IS2473
L801
L802
MUTE
Q814
2SA1115
(E)or(F)
Q815
2SA1115
(E)or(F)

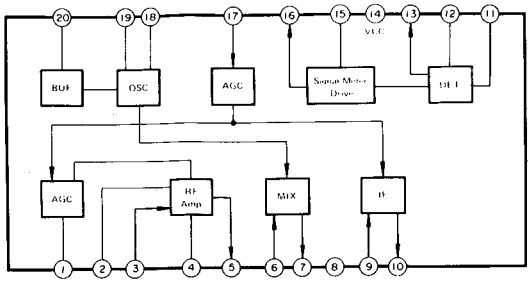

PLL SYNTHESIZER
IC551 AN6875
LED DISPLAY
- SIGNAL STRENGTH + TUNED STEREO
D354 D355 D356 D357 D358 D359 D360
Q71 2SB834(GR)
Q72 2SC2603 (F)or(E)
D71 SIRBA10
D72 IS2473
D73 HZ7B2L
Q74 2SA1115 (F)or(E)
Q75 2SA1115(F)or(E)
Q76 2SA1115(F)or(E)
T71
From LAMP
DC BALANCE ADJ.(Lch)
DC BALANCE ADJ.(Rch)
Q501 2SC2320L(F)
Q503 2SC2320L (F)
Q505 2SC2603 (E)or(F)
Q507 2SC2603 (E)or(F)
Q509 2SA1115 (E)or(F)
Q510 2SA1115 (E)or(F)
Q511 2SC2603 (E)or(F)
Q512 2SC2603 (E)or(F)
Q513 2SA1115(E)or(F)
Q515 2SB647(C)
Q517 2SD667 (C)
Q519 2SK364 (V)or(BL)
Q401 2SK364 (V)or(BL)
Q402 2SK364
Q403 2SC2240(BL)
Q404 2SC2240(BL)
Q405 2SC2240(BL)
Q406 2SC2240(BL)
Q407 2SC2603 (F)or(E)
Q408 2SC2603 (F)or(E)
Q409 2SC2603 (F)or(E)
SW509 subsonic filter
SW510 loudness
SW512 mono mode
SW515 (1/2) bass turnover
SW516 (1/2) tone defeat
SW517 (1/2) treble turnover
VR501 50KM
VR502 50KN
VR503 100KB
VR504 100KB
VR505 50KC
VR507 100KC
VR401 50K
VR402 50K
BASS
TREBLE
BALANCE
VOLUME
D501 IS2473
D502 IS2473
D503 IS2473
D401 IS2473
D402 IS2473
D403 IS2473
D404 IS2473
D74 HZ7B2L
D75 HZ27-3L
D73 HZ7B2L


SW 704 manual
SW 703 auto
SW 701 up
SW 702 down
SW 705 memory
SW 706 M1
SW 707 M2
SW 708 M3
SW 709 M4
SW 710 M5
SW 711 M6
SW 712 M7
SW 713 M8
TUNING
D712
D711
D713
D714
D715
D716
D717
D718
D719
D720
D721
D725
D724
R717 W 220
R718 W 220
R719 W 220
D724,725 IS2473
FM/AM PRESET MEMORY
IDLING ADJ.(Lch)
TP1
TP2
TP3
TP4
TP5
TP6
SW401 SPEAKER system1
SW402 SPEAKER system2
SPEA
Q411 2SA970 (BL)
Q412 2SA970 (BL)
Q413 2SC2240 (BL)
Q414 2SC2240 (BL)
Q415 2SA970(BL)
Q416 2SA970(BL)
Q417 2SA970(BL)
Q418 (BL)
Q419 2SC2240 (BL)
Q420 2SC2240 (BL)
Q421 2SB646A(C)
Q422 2SB646A(C)
Q423 2SD666A(C)
Q424 666A(C)
Q425 2SB646A(C)
Q426 2SB646A(C)
Q427 2SD666A(C)
Q428 666A(C)
Q429 2SC945(K)
Q430 2SC945(K)
Q433 2SD667A(C)
Q434 2SD667A(C)
Q435 2SB647A (C)
Q436 2SB647A (C)
Q437 2SAIIII (Q)or(R)or(S)
Q438 2SAIIII (Q)or(R)or(S)
Q439 2SC2591 (Q)or(R)or(S)
Q440 2SC2591
Q441 2SC3281(O)or(R)
Q442 2SC3281(O)or(R)
Q443 2SAI302(O)or(R)
Q444 2SAI302(O)or(R)
Q9 2SA970(BL)
Q10 2SA970(BL)
D401 IS2473
D402 IS2473
D403 HZ15-1L
D404 HZ15-1L
D405 10DF2
D406 10DF2
D407 10DF2
D408 10DF2
D409 MV12YM
D410 MV12YM
VR401 50K
VR402 50K
VR403
VR404
L1
L2
L3
L4
L5
L6
44.0V
43.4V
42.2V
43.6V
0.6V
0.1V
42.4V
41.6V
41.7V
-42.3V
-0.6V
-1.1V
-43.0V
-0.5V
-43.7V
-14.4V
-43.3V
-43.6V
44.0V

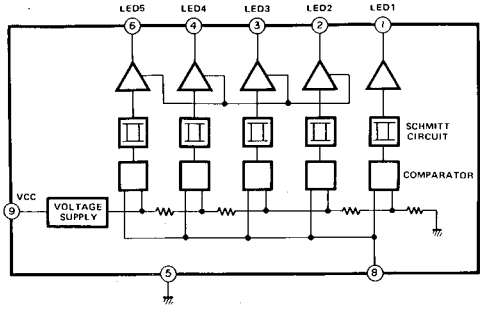




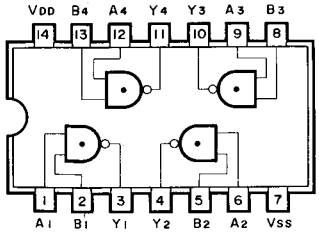
LA1245 : IC251



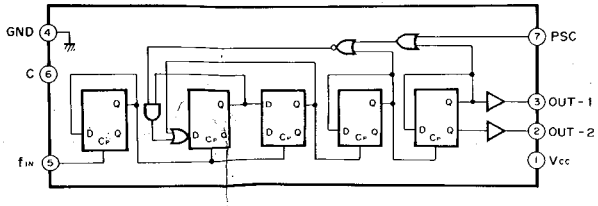
AN6875 : IC351



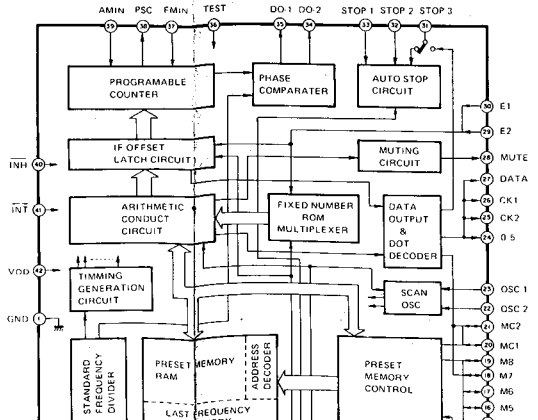
TC4011BP : IC352

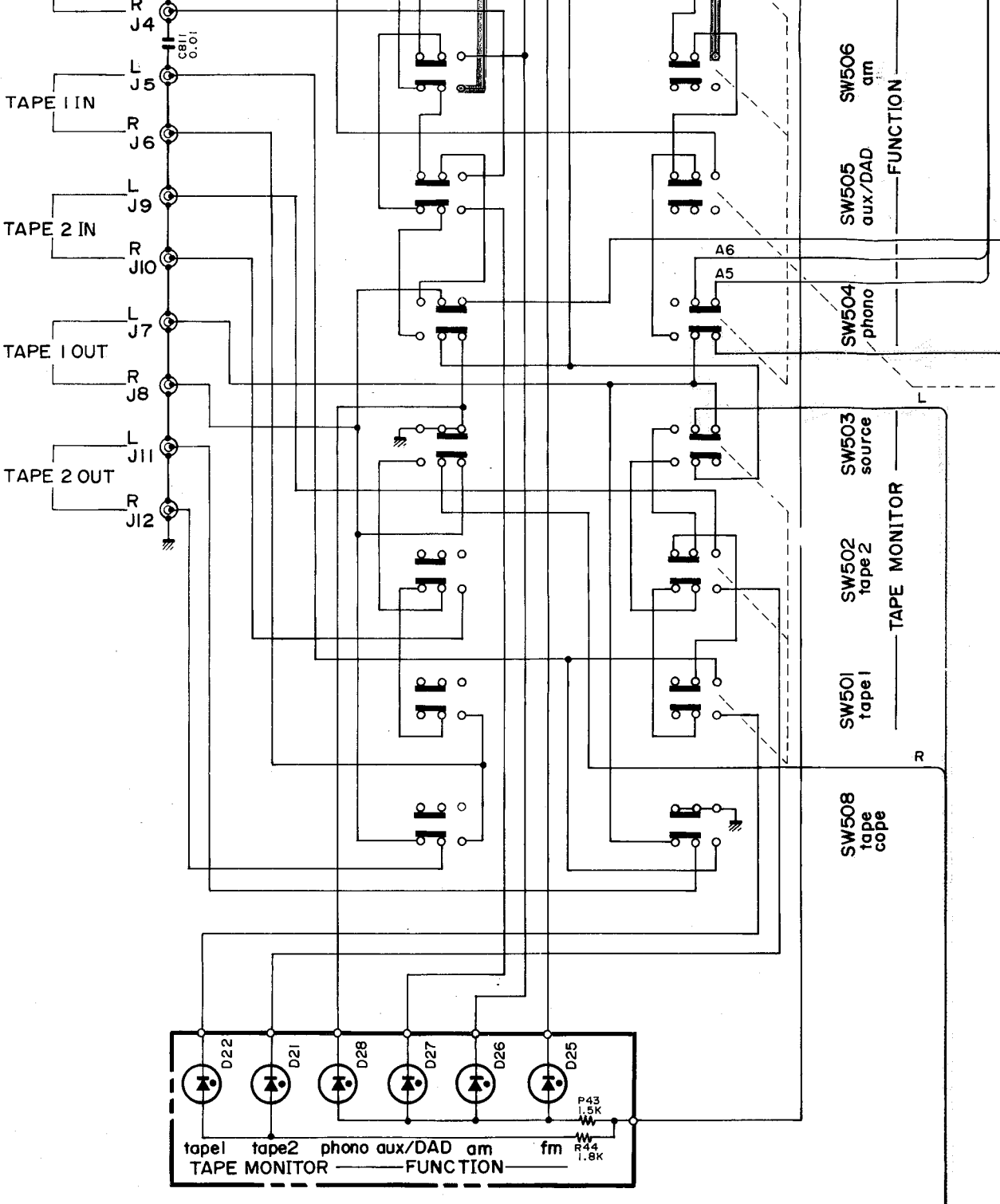


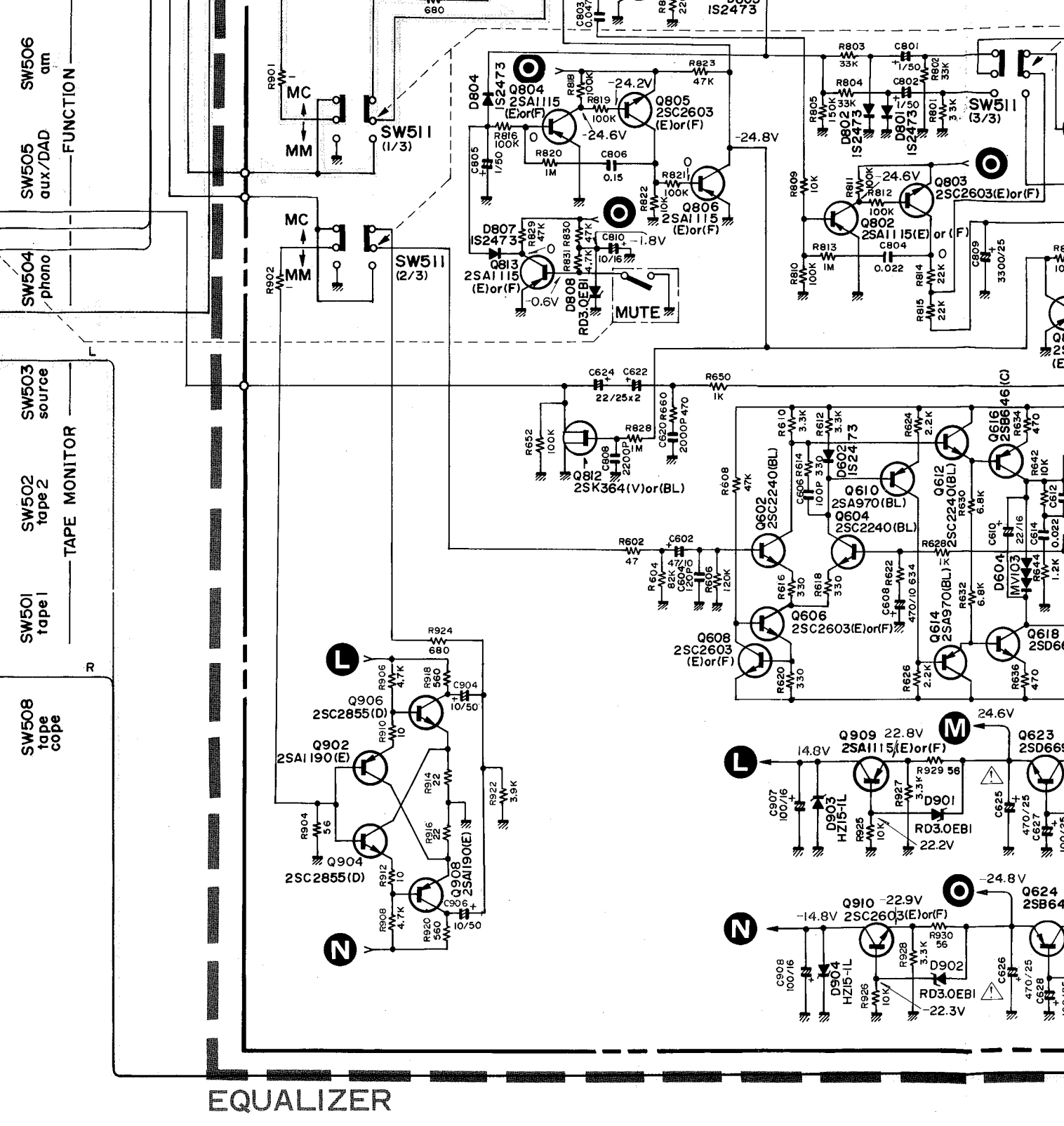
TD6104P : IC701

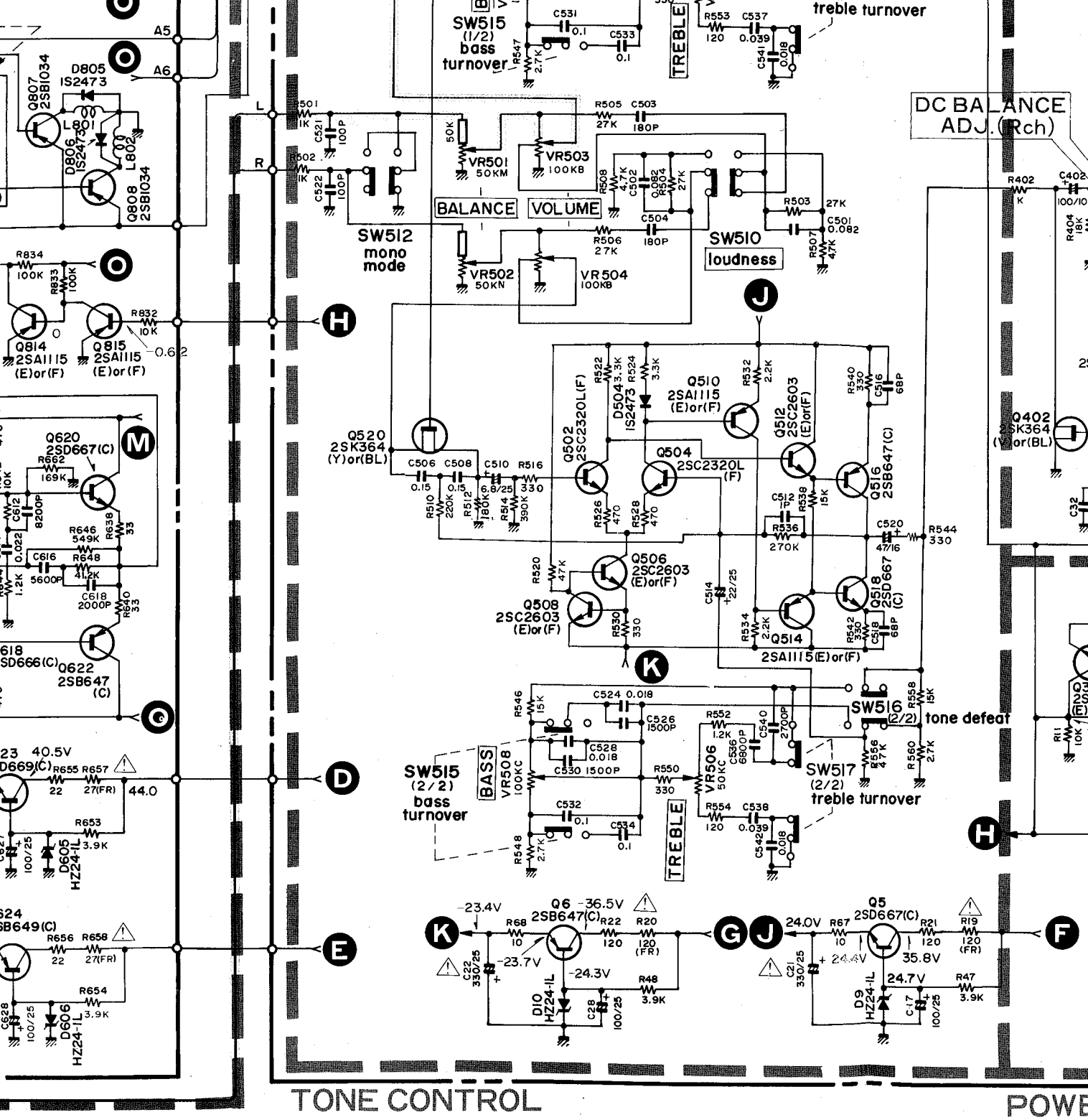


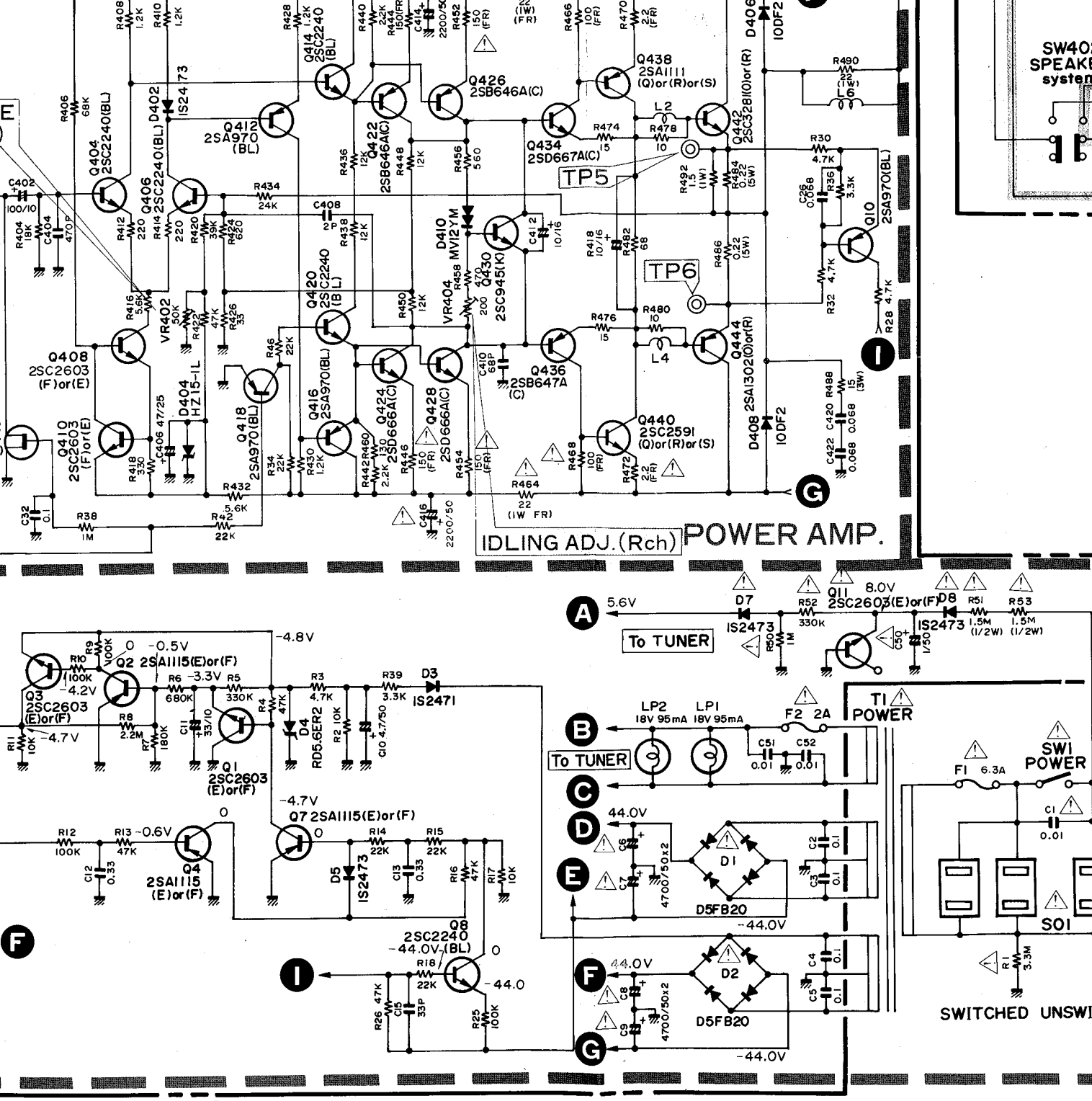
TC9147AP : IC702

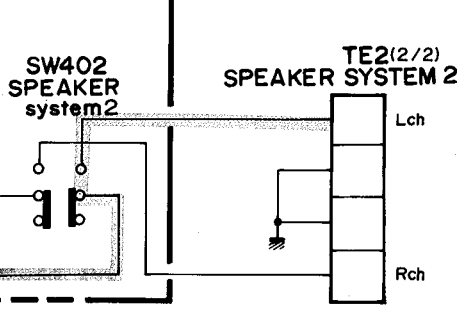


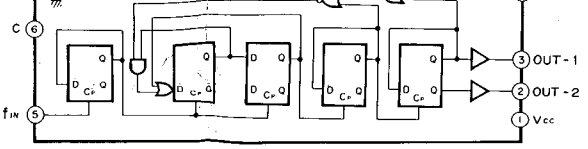

R
J4
C811
0.01
L
J5
TAPE 1 IN
R
J6
L
J9
TAPE 2 IN
R
J10
L
J7
TAPE 1 OUT
R
J8
L
J11
TAPE 2 OUT
R
J12
SW506
am
SW505
aux/DAD
FUNCTION
A6
A5
SW504
phono
L
SW503
source
SW502
tape 2
TAPE MONITOR
SW501
tape 1
R
SW508
tape
cope
D22
D21
D28
D27
D26
D25
P43
1.5K
R44
1.8K
tape1
tape2
phono
aux/DAD
am
fm
TAPE MONITOR
FUNCTION


SW506 am
SW505 aux/DAD
FUNCTION
SW504 phono
SW503 source
SW502 tape 2
TAPE MONITOR
SW501 tape 1
SW508 tape cope
MC
MM
SW511 (1/3)
SW511 (2/3)
SW511 (3/3)
Q804 2SA1115 (E)or(F)
Q805 2SC2603 (E)or(F)
Q806 2SA1115 (E)or(F)
Q807 IS2473
Q813 2SA1115 (E)or(F)
D804 IS2473
D807 IS2473
D808 RD3.0EB1
MUTE
-24.2V
-24.6V
-24.8V
-1.8V
-0.6V
Q803 2SC2603(E)or(F)
Q802 2SA1115(E) or (F)
D802 IS2473
D801 IS2473
Q812 2SK364(V)or(BL)
Q602 2SC2240(BL)
Q604 2SC2240(BL)
Q610 2SA970(BL)
Q612 2SC2240(BL)
Q606 2SC2603(E)or(F)
Q608 2SC2603 (E)or(F)
Q614 2SA970(BL)
Q616 2SB646(C)
D602 IS2473
D604 MV103
Q902 2SA1190(E)
Q904 2SC2855(D)
Q906 2SC2855(D)
Q908 2SA1190(E)
Q909 22.8V 2SA1115(E)or(F)
Q910 -22.9V 2SC2603(E)or(F)
D901 RD3.0EB1
D902 RD3.0EB1
D903 HZ15-L
D904 HZ15-L
14.8V
-14.8V
22.2V
-22.3V
24.6V
EQUALIZER

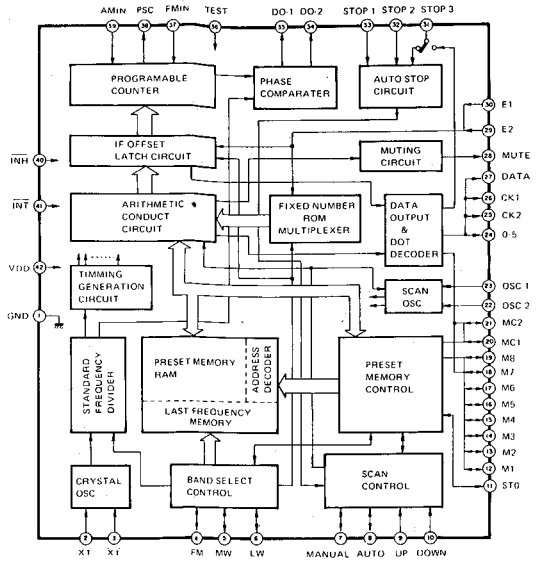

SW515 (1/2) bass turnover
treble turnover
DC BALANCE ADJ. (Rch)
BALANCE
VOLUME
VR501 50KM
VR503 100KB
VR502 50KN
VR504 100KB
SW512 mono mode
SW510 loudness
Q520 2SK364 (Y)or(BL)
Q502 2SC2320L(F)
Q504 2SC2320L (F)
Q510 2SA1115 (E)or(F)
Q512 2SC2603 (E)or(F)
Q516 2SB647(C)
Q506 2SC2603 (E)or(F)
Q508 2SC2603 (E)or(F)
Q514 2SA1115(E)or(F)
Q518 2SD667 (C)
D5043 3K IS2473
SW516 (2/2) tone defeat
SW517 (2/2) treble turnover
SW515 (2/2) bass turnover
BASS
TREBLE
VR506 50KC
VR508 100KC
Q807 2SB1034
Q808 2SB1034
D805 IS2473
L801
L802
Q806 IS2473
Q814 2SA1115 (E)or(F)
Q815 2SA1115 (E)or(F)
Q620 2SD667(C)
Q622 2SB647 (C)
Q402 2SK364 (Y)or(BL)
D605 HZ24-IL
D606 HZ24-IL
D9 HZ24-IL
D10 HZ24-IL
Q6 2SB647(C)
Q5 2SD667(C)
-23.4V
-23.7V
-24.3V
-36.5V
24.0V
24.4V
35.8V
24.7V
40.5V
44.0
TONE CONTROL
POWE

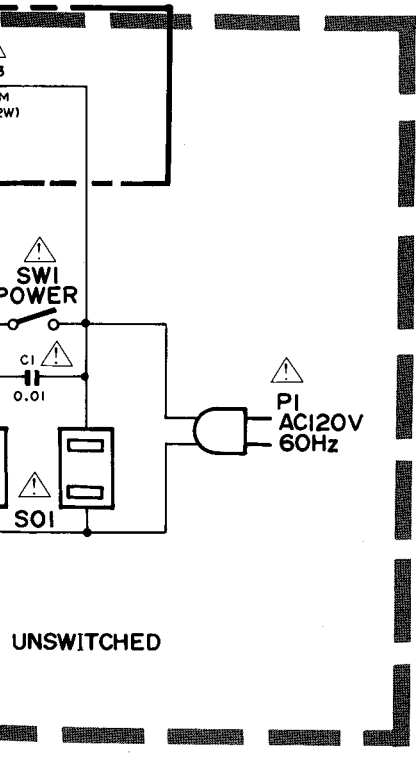

TP5
TP6
IDLING ADJ.(Rch)
POWER AMP.
To TUNER
To TUNER
SWITCHED UNSWI
OWER SUPPLY



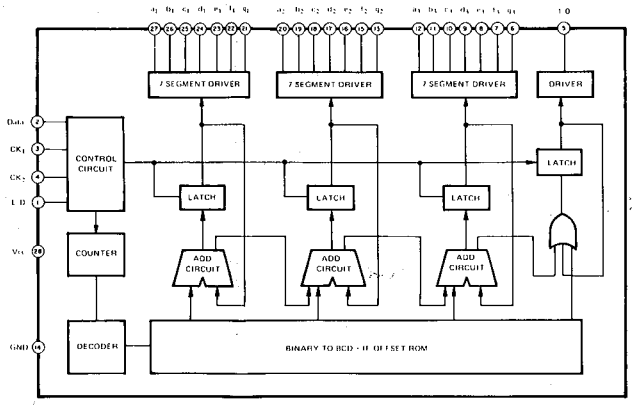


TC9147AP : IC702





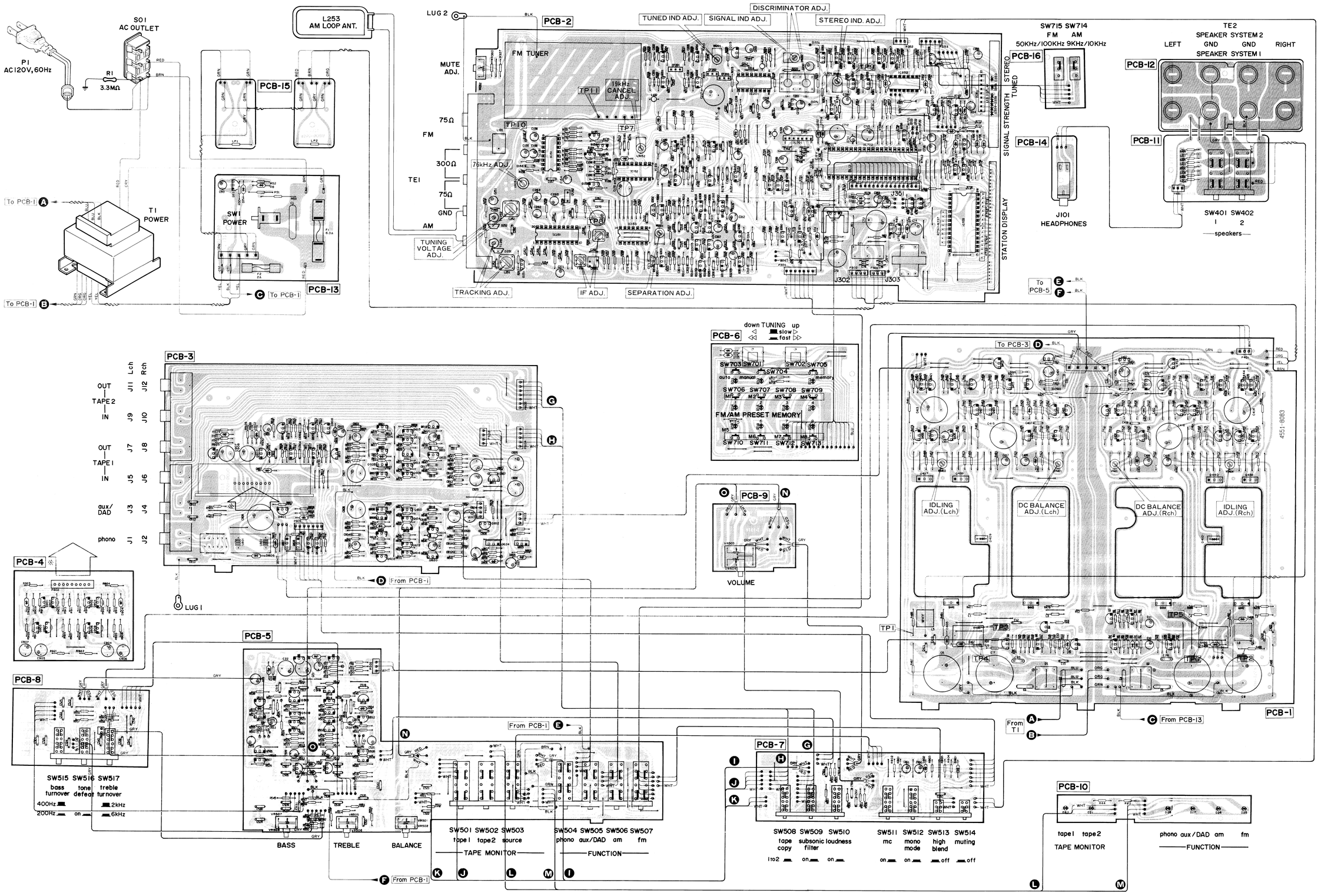
TD6301AP : IC703



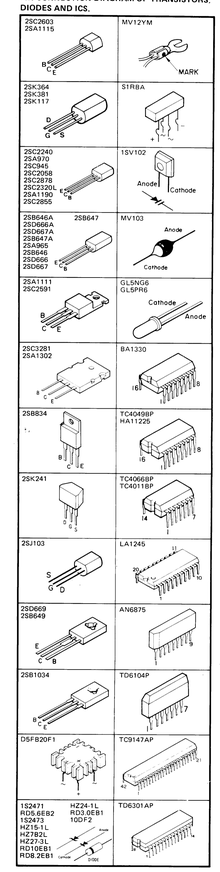
..... FM SIGNAL
..... AM SIGNAL
..... PHONO SIGNAL

1. ALL RESISTANCES VALUES ARE IN Ω.
   KΩ=1000Ω, MΩ=1000KΩ.
2. THE WATTAGE OF RESISTORS IS 1/4W UNLESS OTHERWISE NOTED.
3. ALL CAPACITANCES VALUES ARE IN μF UNLESS OTHERWISE NOTED. P=μμF
4. V: DC VOLTAGE AT NO SIGNAL
   [. . . V] FM POSITION
   (. . . V) AM POSITION
5. ⚠ SAFETY-REQUIREMENTS COMPONENTS IN ACCORDANCE WITH PRESENT SAFETY REGULATIONS. THESE COMPONENTS MUST ONLY BE REPLACED BY ORIGINAL PARTS.

WIRING DIAGRAM



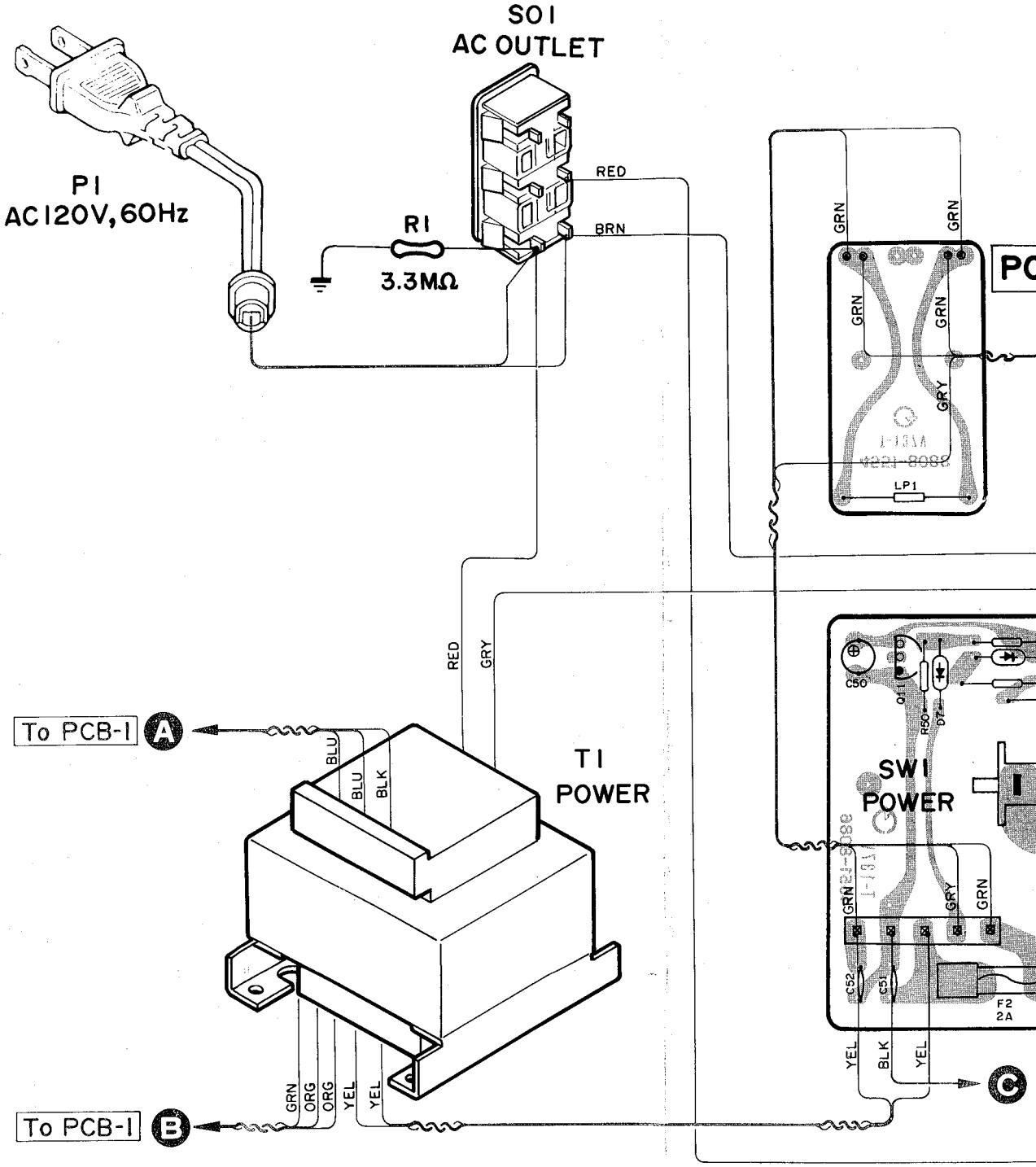
PIN CONNECTION DIAGRAM OF TRANSISTORS, DIODES AND ICS.

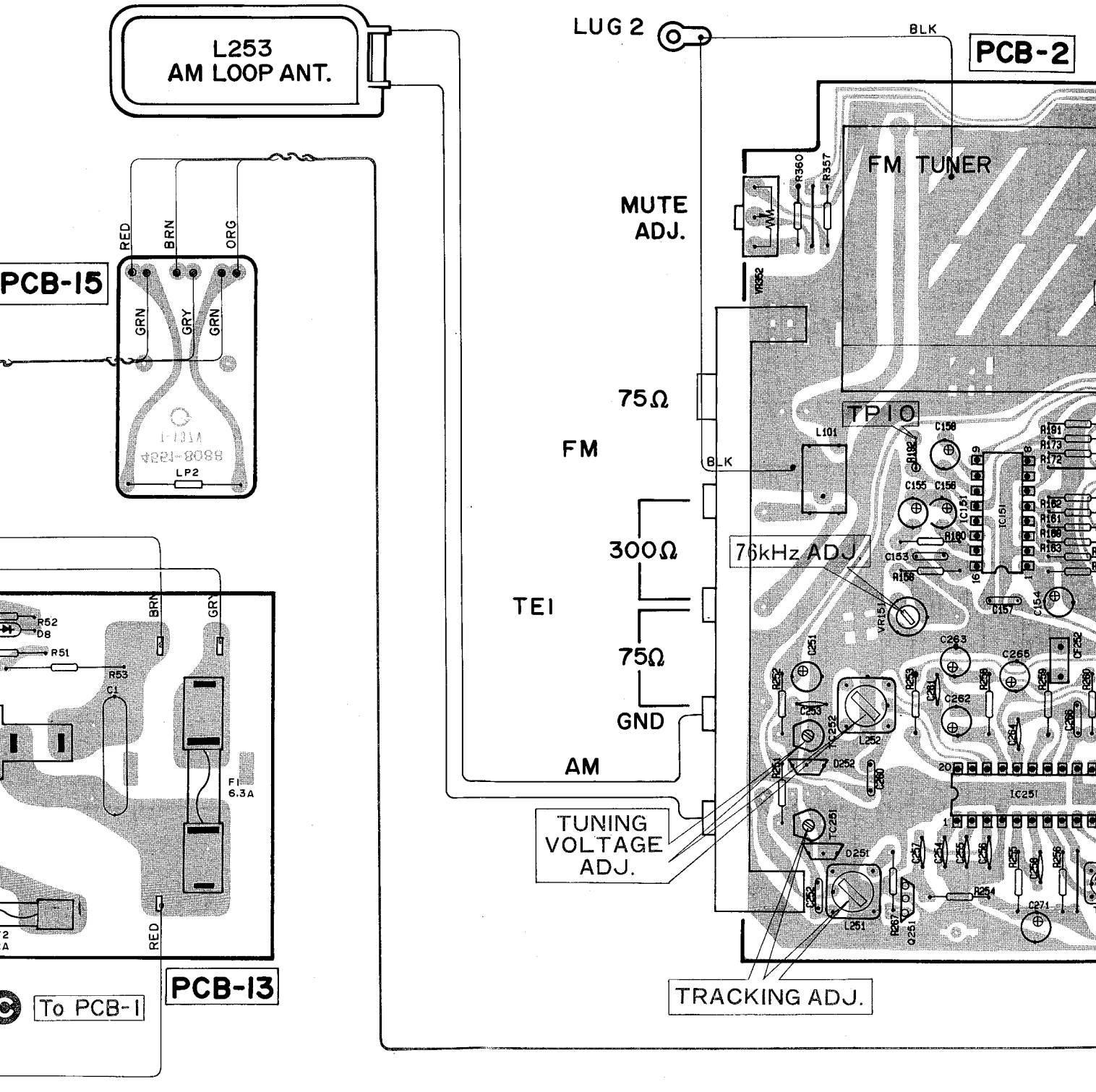


WIRE COLOR ABBREVIATIONS

RED : Red	GRN : Green
WHT : White	ORG : Orange
BLK : Black	YEL : Yellow
GRY : Gray	BRN : Brown
BLU : Blue	

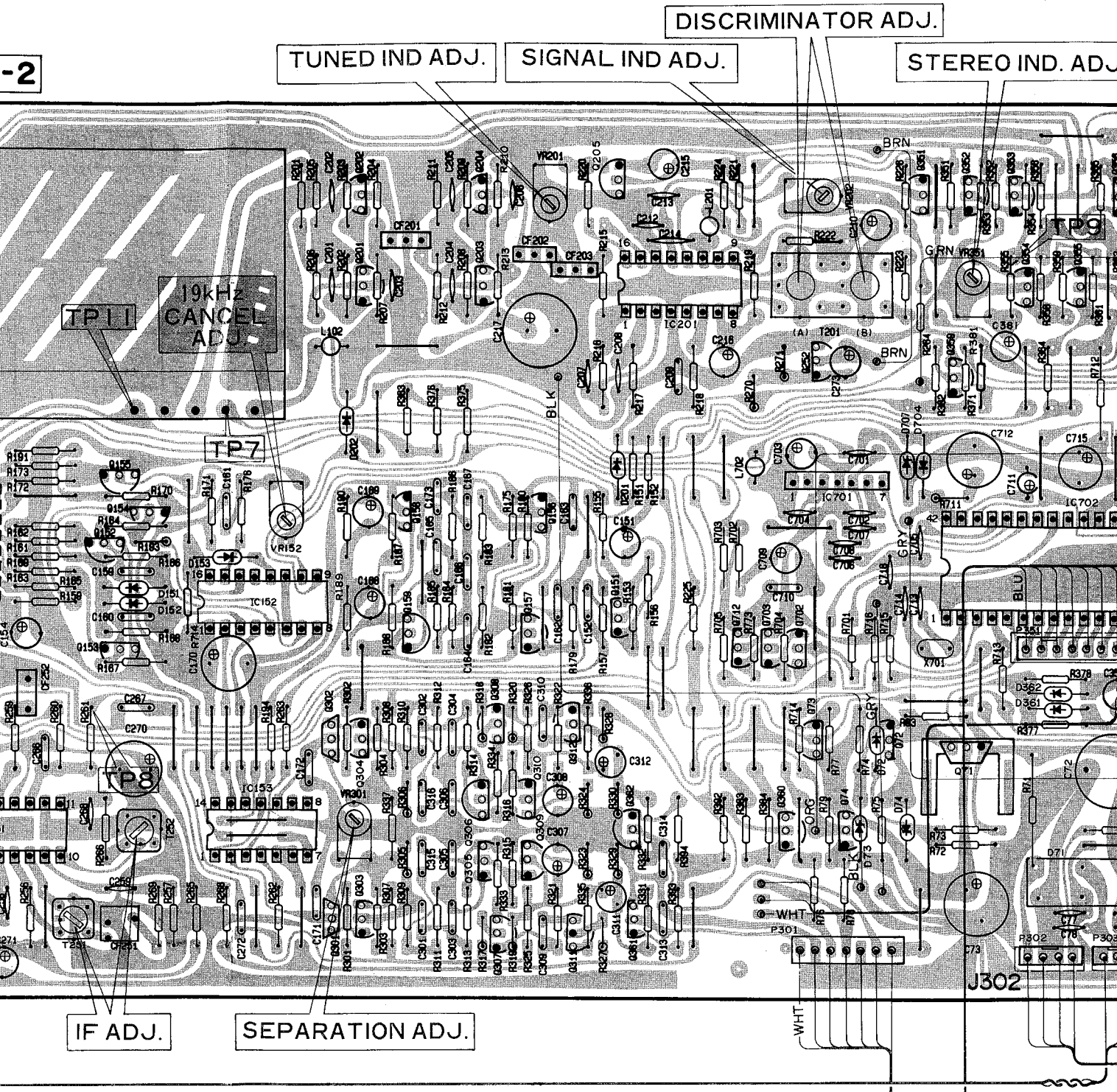
WIRING DIAGRAM




L253
AM LOOP ANT.
LUG 2
BLK
PCB-2
FM TUNER
MUTE
ADJ.
75Ω
FM
BLK
300Ω
TEI
75Ω
GND
AM
TUNING
VOLTAGE
ADJ.
TRACKING ADJ.
76kHz ADJ.
TP10
RED
BRN
ORG
GRN
GRY
GRN
LP2
PCB-15
PCB-13
To PCB-1
FI
6.3A

	I	J	K	L

-2

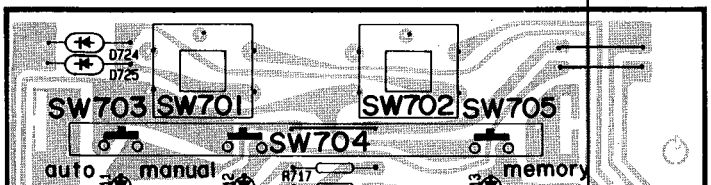


down TUNING up

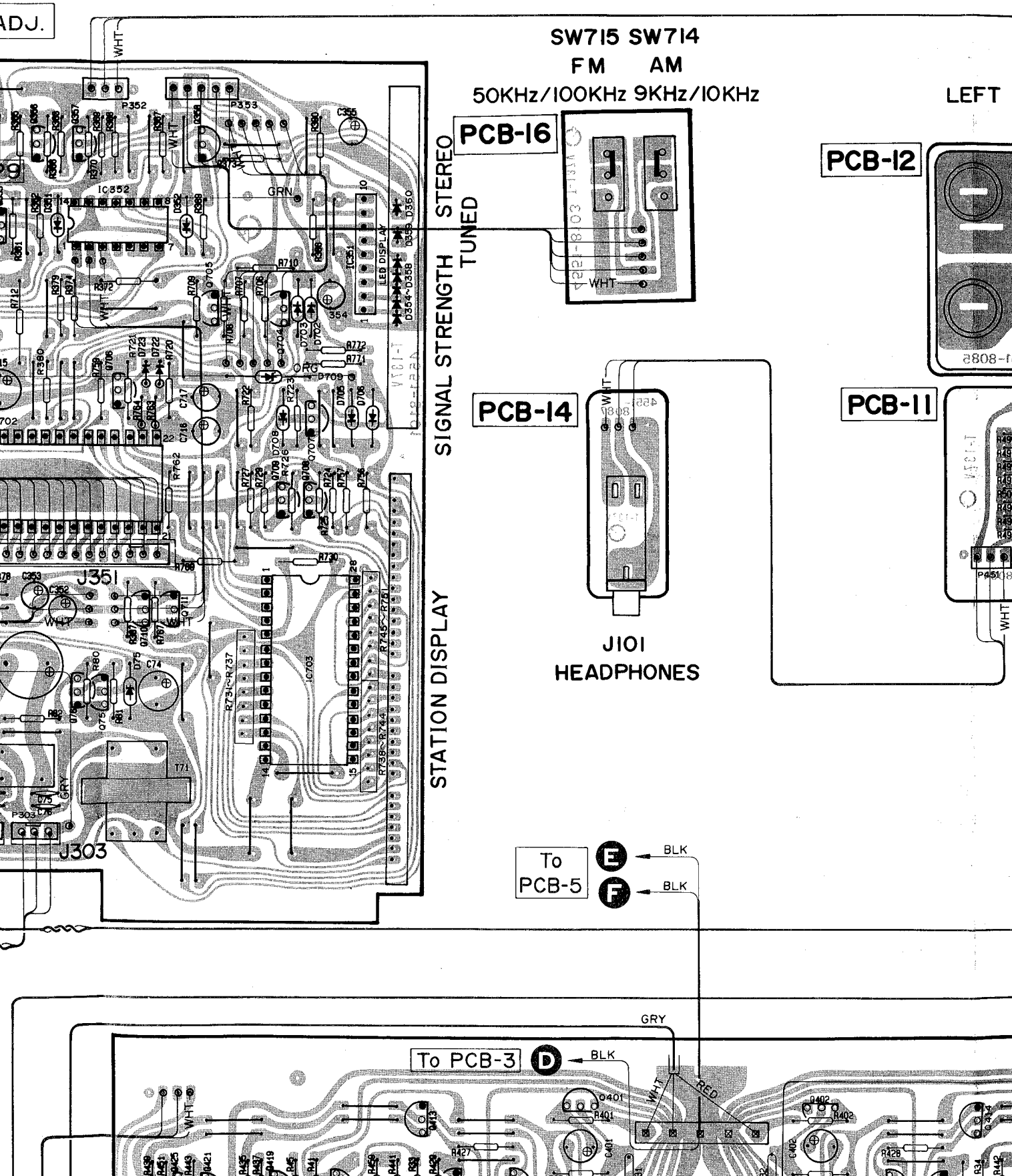
slow

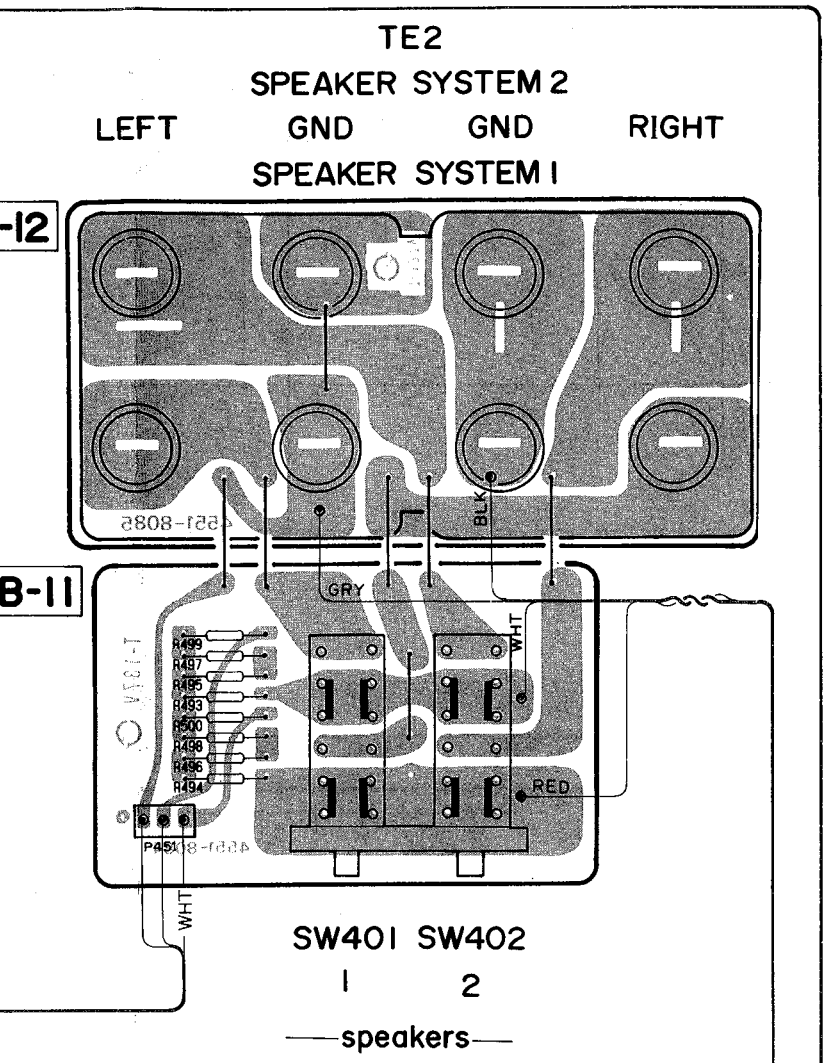
fast

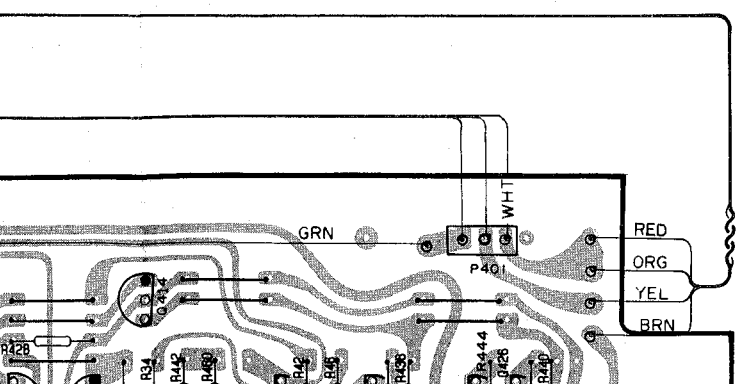
PCB-6



M	N	O	P

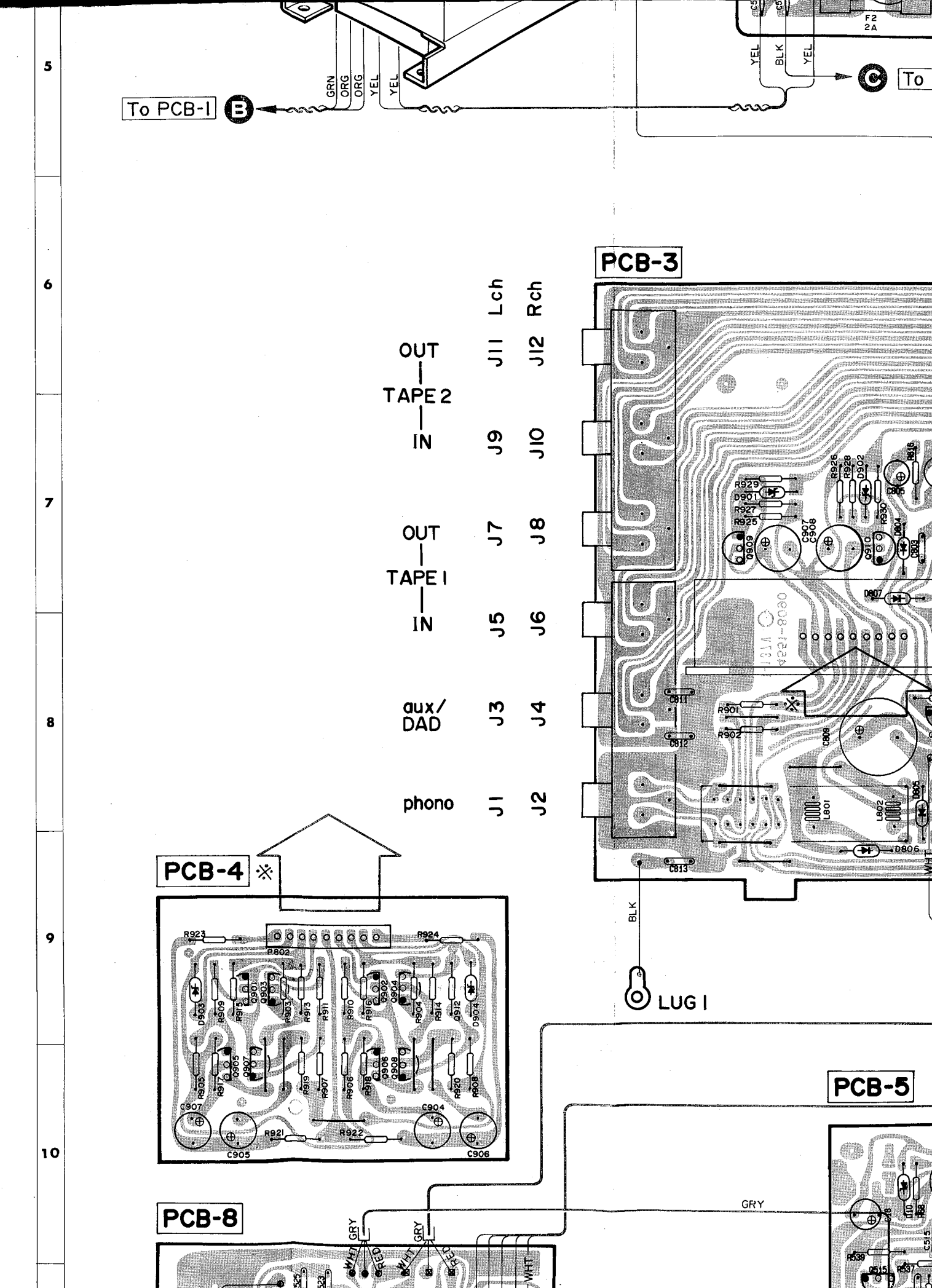

ADJ.
SW715 SW714
FM AM
50KHz/100KHz 9KHz/10KHz
LEFT
PCB-16
PCB-12
PCB-14
PCB-11
STEREO
TUNED
SIGNAL STRENGTH
STATION DISPLAY
J101
HEADPHONES
J351
J303
To PCB-5
To PCB-3
WHT
GRN
ORG
BLK
GRY
RED
LED DISPLAY
IC352
IC703
P352
P353
P303
P451
C355
C354
C353
C352
C74
C75
C76
C717
C716
R710
R772
R771
R730
R737
R744
R745
R762
R768
R372
R379
R374
R712
R380
R720
R721
R722
R723
R726
R727
R728
R729
R731
R732
R733
R734
R735
R736
R738
R739
R740
R741
R742
R743
R746
R747
R748
R749
R750
R751
R752
R753
R754
R755
R756
R757
R758
R759
R760
R761
R763
R764
R765
R766
R767
R80
R81
R82
R401
R402
R427
R428
D703
D702
D709
D708
D707
D706
D705
D704
D701
D75
D76
D350
D351
D352
D353
D354-D358
Q705
Q704
Q703
Q702
Q701
Q710
Q711
Q75
Q76
T71

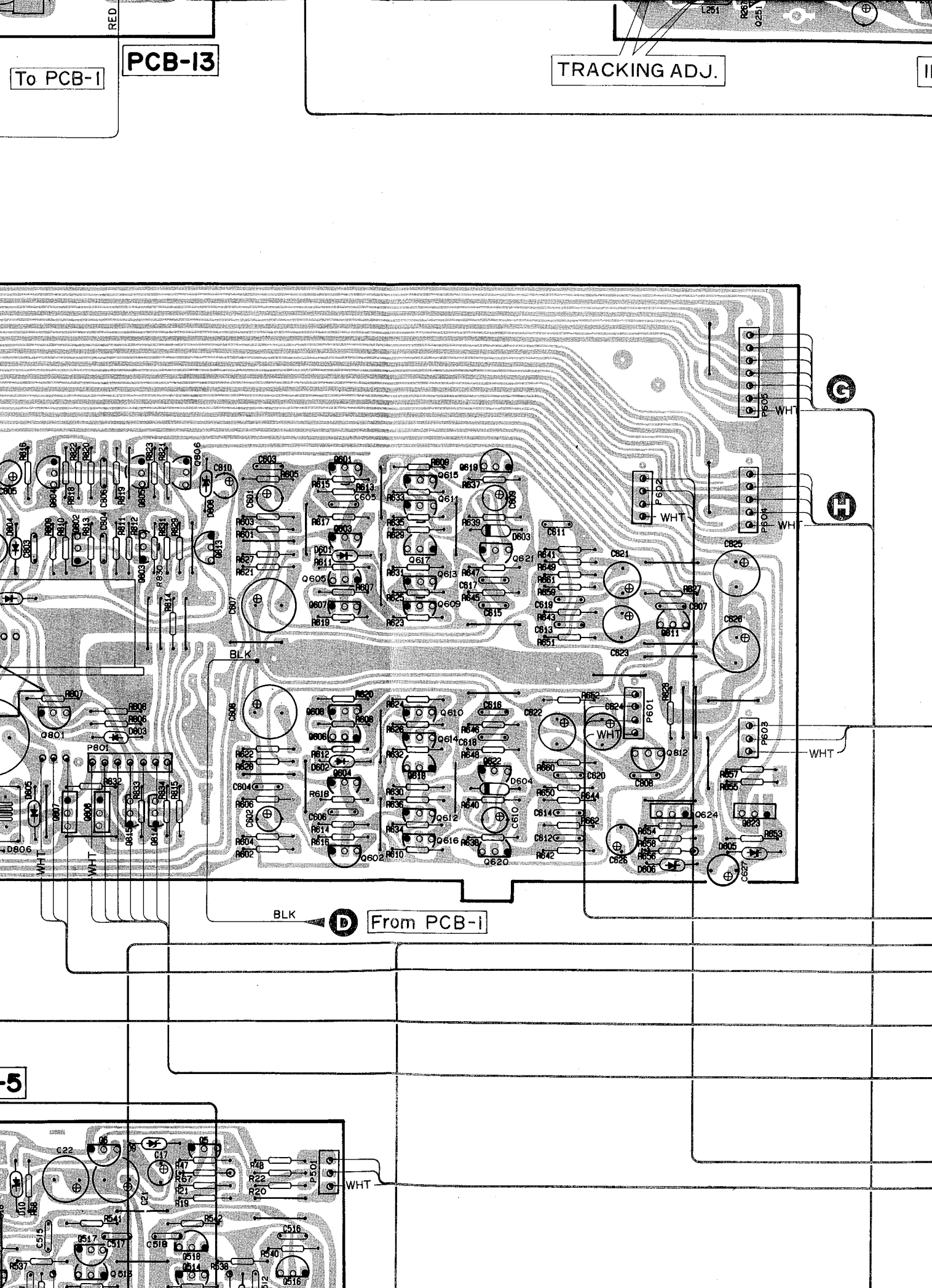




PIN CONNECTION DIAGRAM OF TRANSISTORS, DIODES AND ICS.

2SC2603 2SA1115	MV12YM


To PCB-1
B
GRN
ORG
ORG
YEL
YEL
C
To
YEL
BLK
YEL
F2
2A
PCB-3
OUT
TAPE 2
IN
OUT
TAPE 1
IN
aux/
DAD
phono
Lch
Rch
J11
J12
J9
J10
J7
J8
J5
J6
J3
J4
J1
J2
BLK
LUG 1
PCB-4
※
PCB-5
PCB-8
GRY
WHT
RED
WHT
RED
GRY
WHT


RED
To PCB-1
PCB-13
TRACKING ADJ.
L251
Q251
G
H
P605
WHT
P604
WHT
P602
WHT
P601
WHT
P603
WHT
BLK
BLK
D
From PCB-1
-5
WHT
P501

IF ADJ.

SEPARATION ADJ.

J302

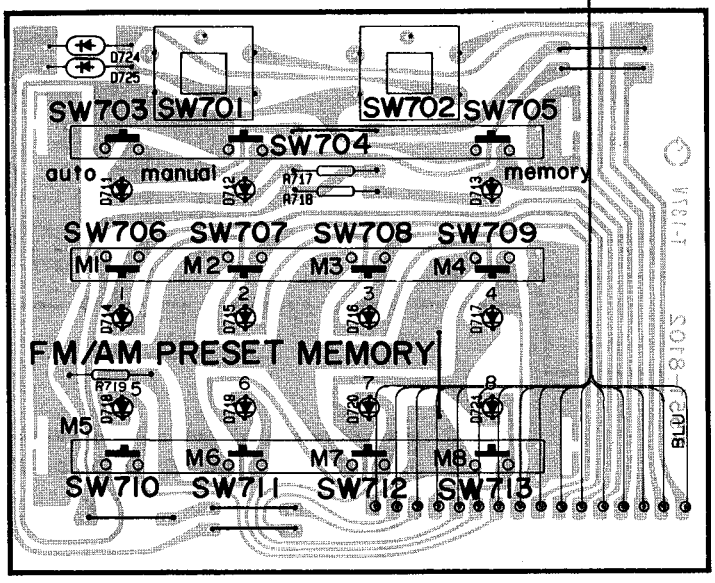
WHT

down TUNING up

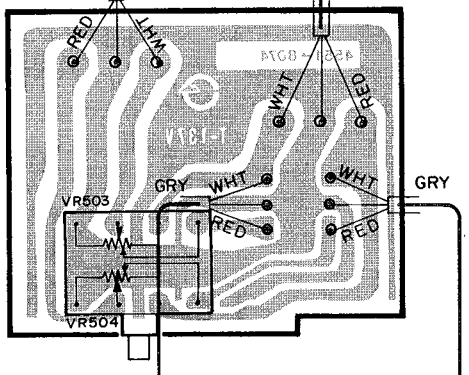
slow

fast

PCB-6

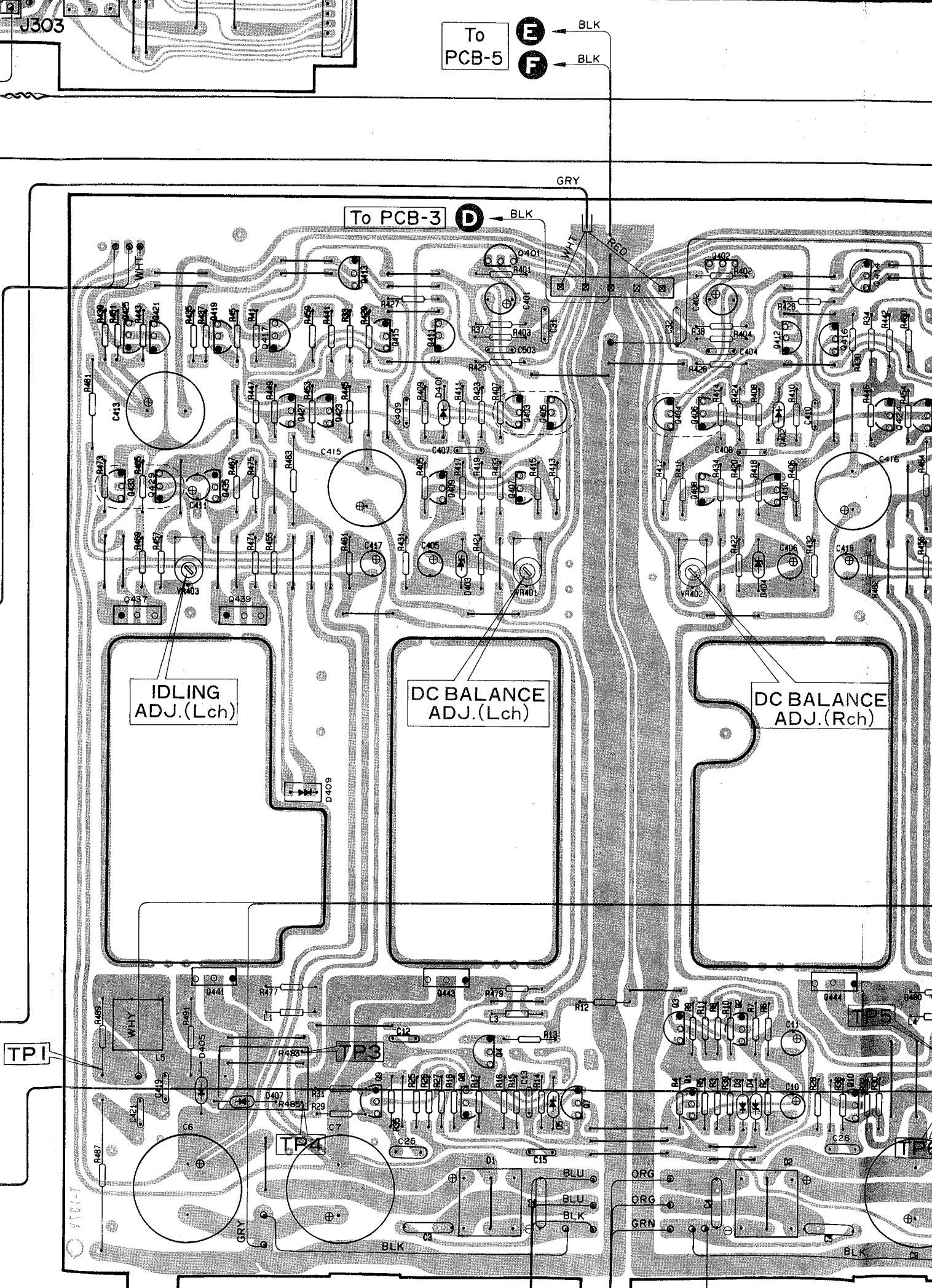


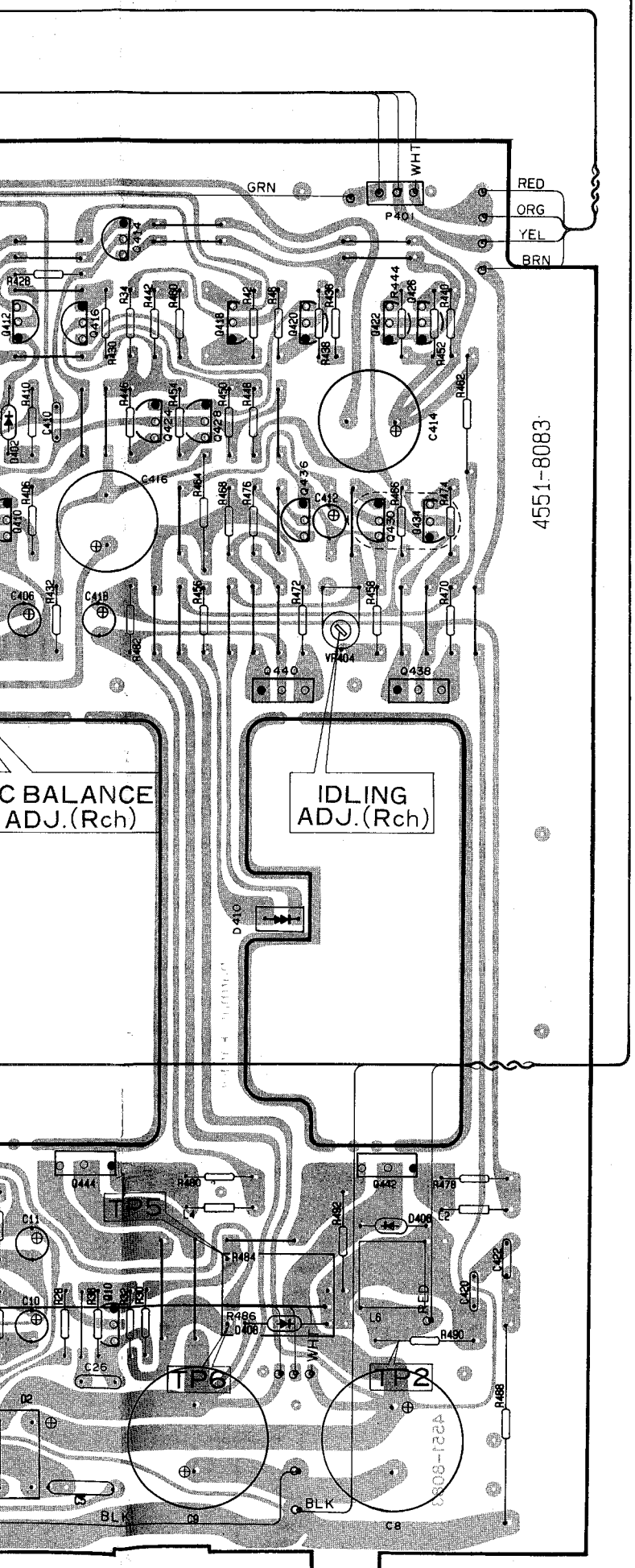
PCB-9



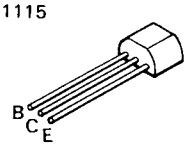
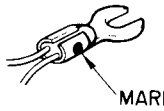
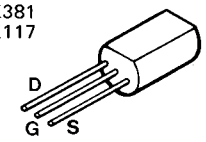
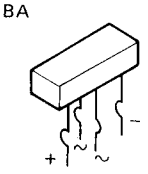
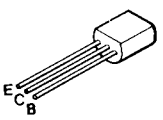
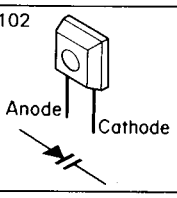
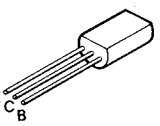
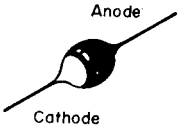
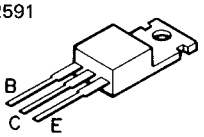
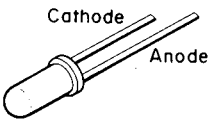
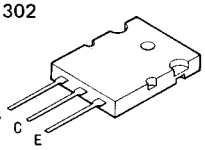
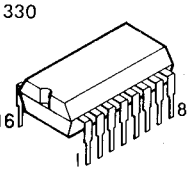
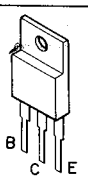
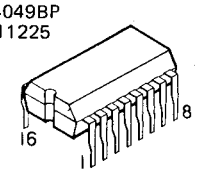
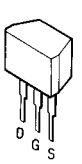
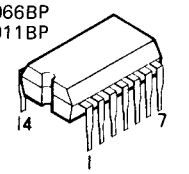
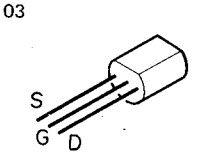
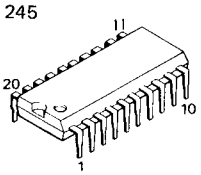
VOLUME

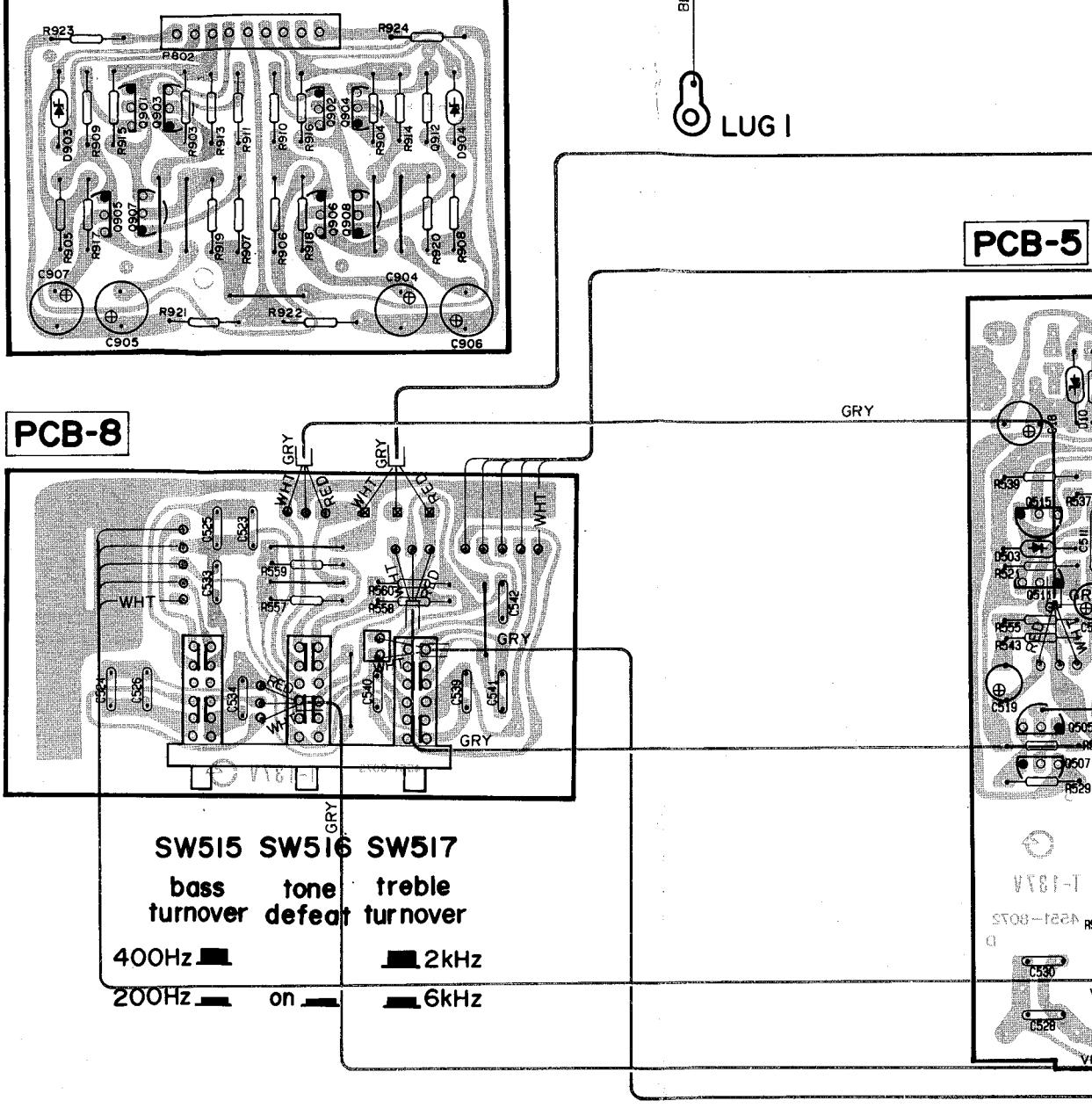
TP

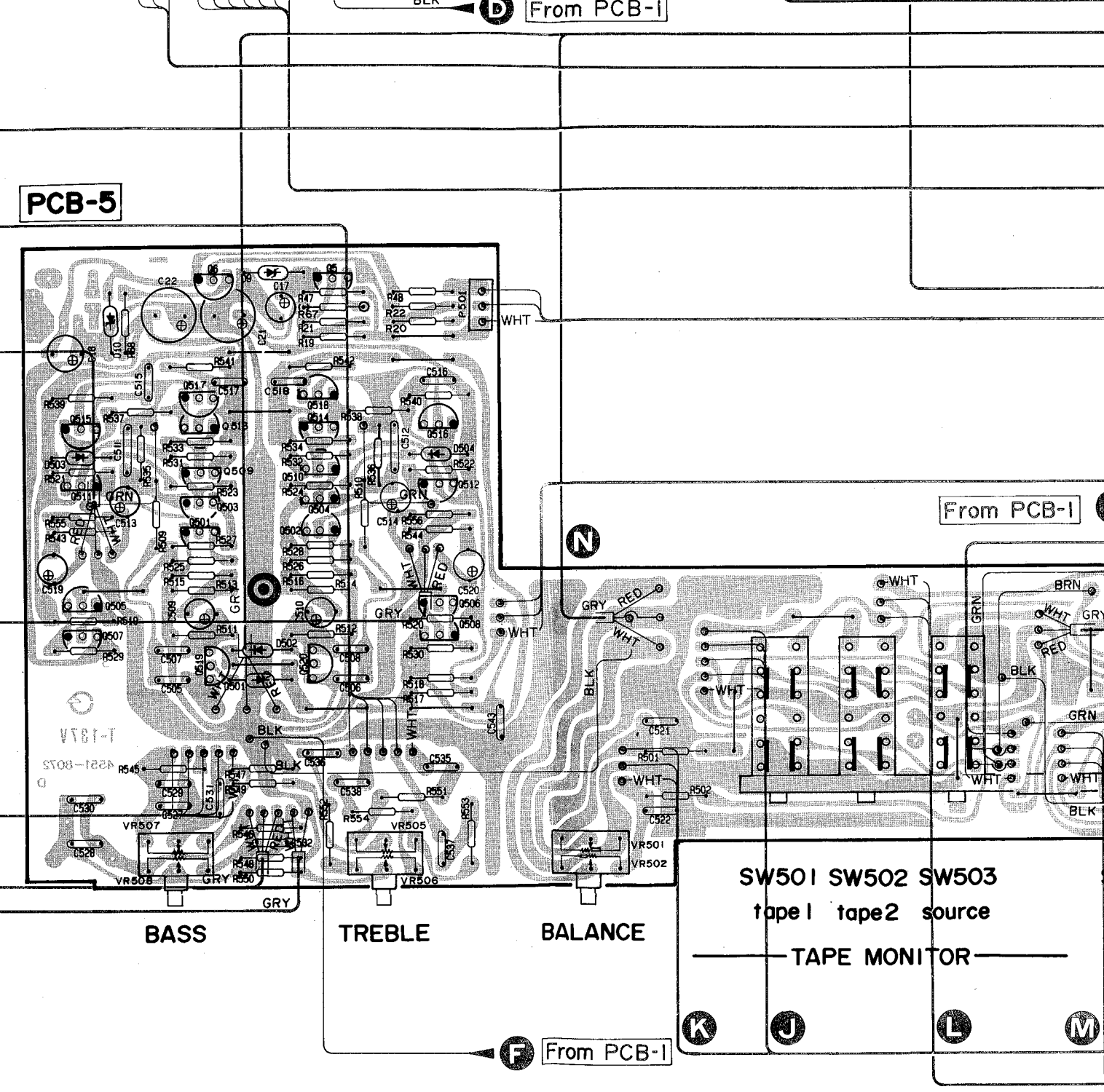

J303
To PCB-5
E
BLK
F
BLK
GRY
To PCB-3
D
BLK
WHT
RED
IDLING ADJ.(Lch)
DC BALANCE ADJ.(Lch)
DC BALANCE ADJ.(Rch)
TP1
TP3
TP4
TP5
BLU
BLU
BLK
ORG
ORG
GRN
GRY
BLK
BLK



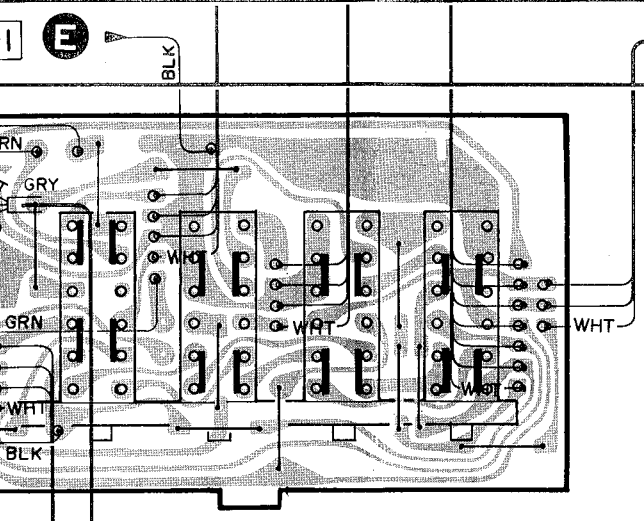
PIN CONNECTION DIAGRAM OF TRANSISTORS, DIODES AND ICS.

2SC2603 2SA1115 	MV12YM 
2SK364 2SK381 2SK117 	S1RBA 
2SC2240 2SA970 2SC945 2SC2058 2SC2878 2SC2320L 2SA1190 2SC2855 	1SV102 
2SB646A 2SD666A 2SD667A 2SB647A 2SA965 2SB646 2SD666 2SD667 2SB647 	MV103 
2SA1111 2SC2591 	GL5NG6 GL5PR6 
2SC3281 2SA1302 	BA1330 
2SB834 	TC4049BP HA11225 
2SK241 	TC4066BP TC4011BP 
2SJ103 	LA1245 


LUG 1
PCB-5
PCB-8
GRY
WHT
RED
SW515 SW516 SW517
bass turnover
tone defeat
treble turnover
400Hz
200Hz
on
2kHz
6kHz


PCB-5
From PCB-1
From PCB-1
From PCB-1
WHT
GRY
RED
WHT
BLK
GRN
BRN
WHT
GRY
RED
WHT
BLK
GRN
WHT
BLK
BASS
TREBLE
BALANCE
SW501 SW502 SW503
tape 1 tape2 source
TAPE MONITOR
D
N
F
K
J
L
M

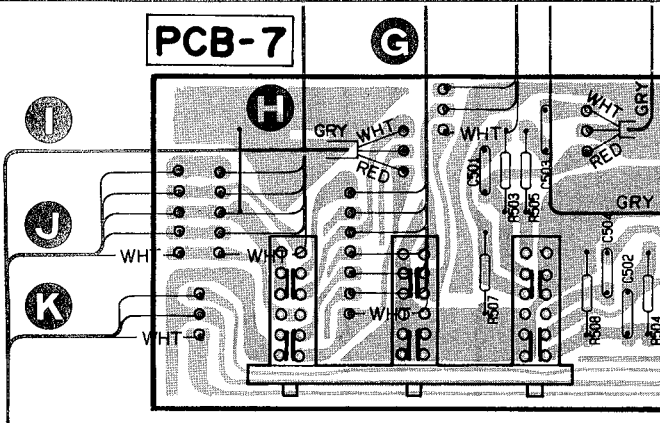
VOLUME



SW504 SW505 SW506 SW507

phono aux/DAD am fm

FUNCTION

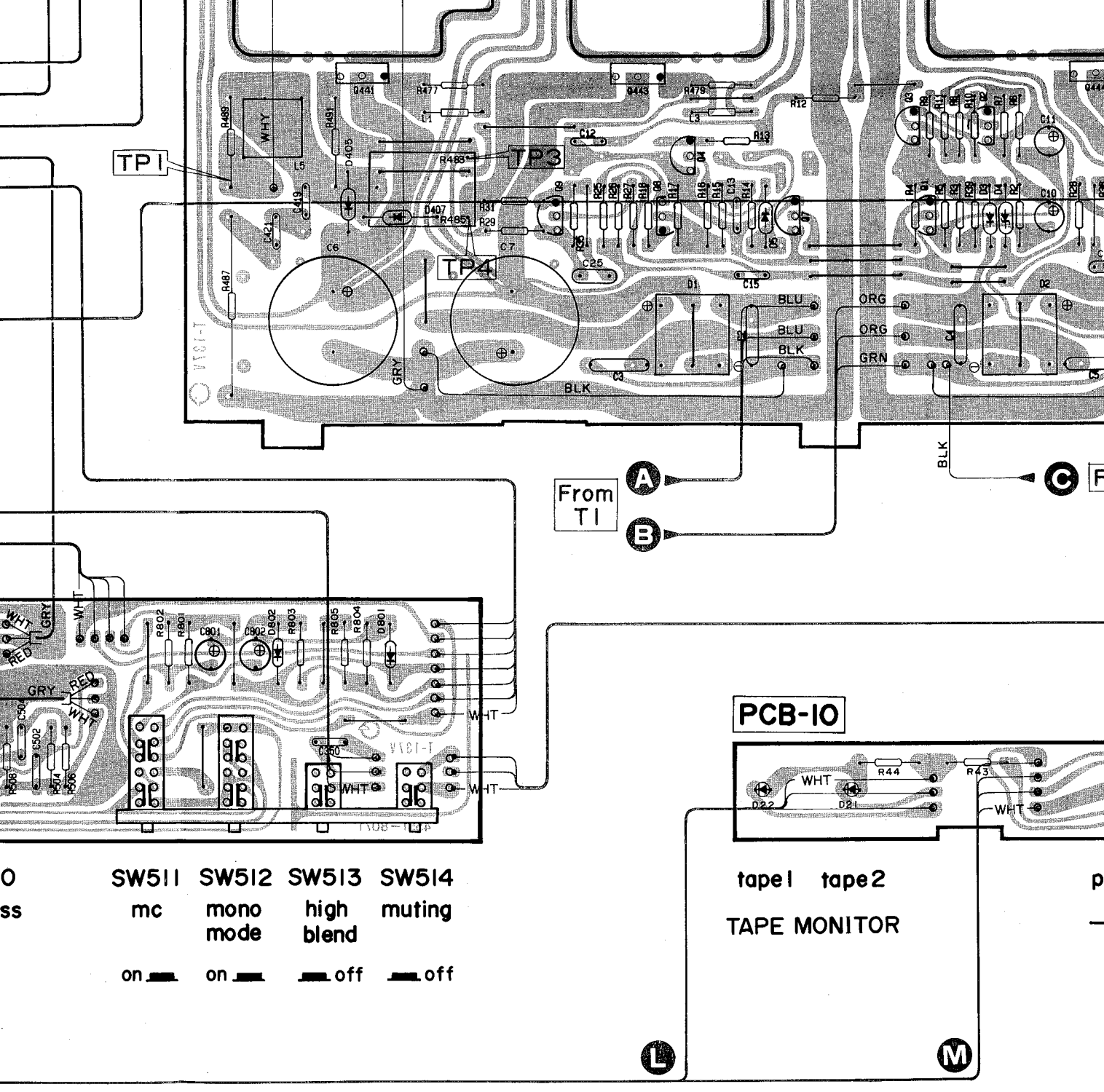


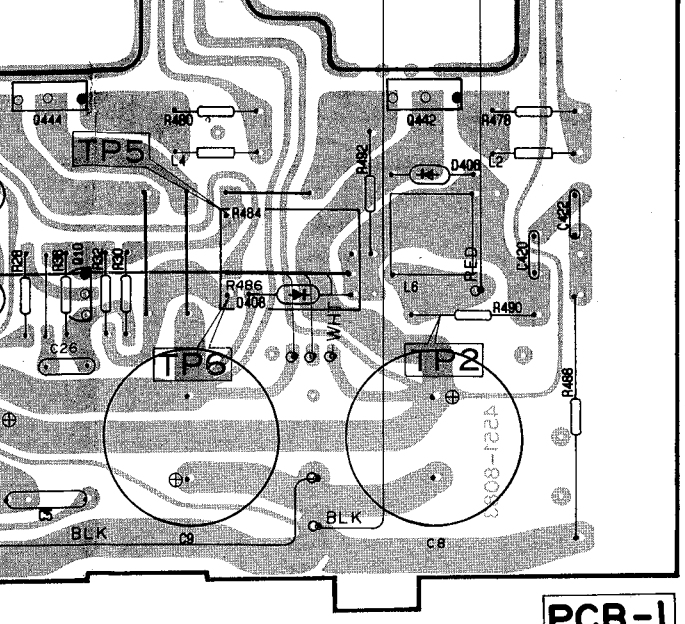
SW508 SW509 SW510

tape copy | subsonic filter | loudness

1 to 2 ▬ | on ▬ | on ▬

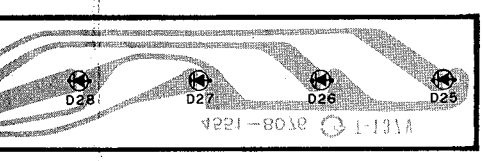
M I


TP1
TP3
TP4
From T1
A
B
C
BLU
BLU
BLK
ORG
ORG
GRN
BLK
GRY
BLK
WHT
GRY
RED
WHT
GRY
RED
WHT
WHT
WHT
WHT
PCB-10
WHT
WHT
tape1 tape2
TAPE MONITOR
L
M
SW511 mc
SW512 mono mode
SW513 high blend
SW514 muting
on
on
off
off



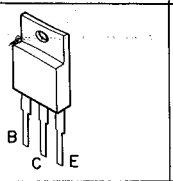
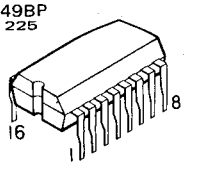
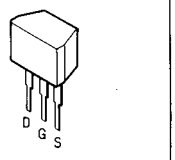
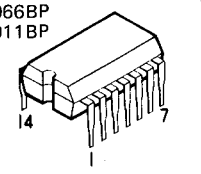
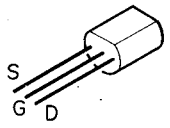
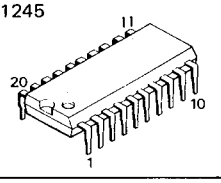
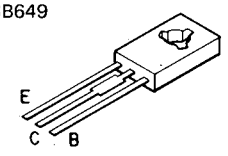
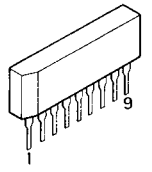
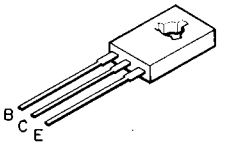
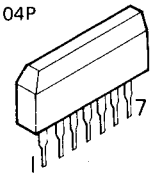
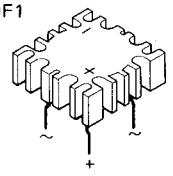
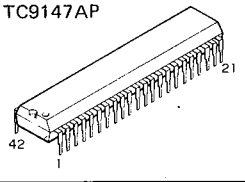
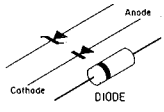
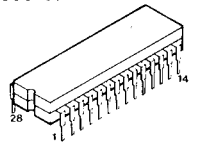
PCB-1

From PCB-13



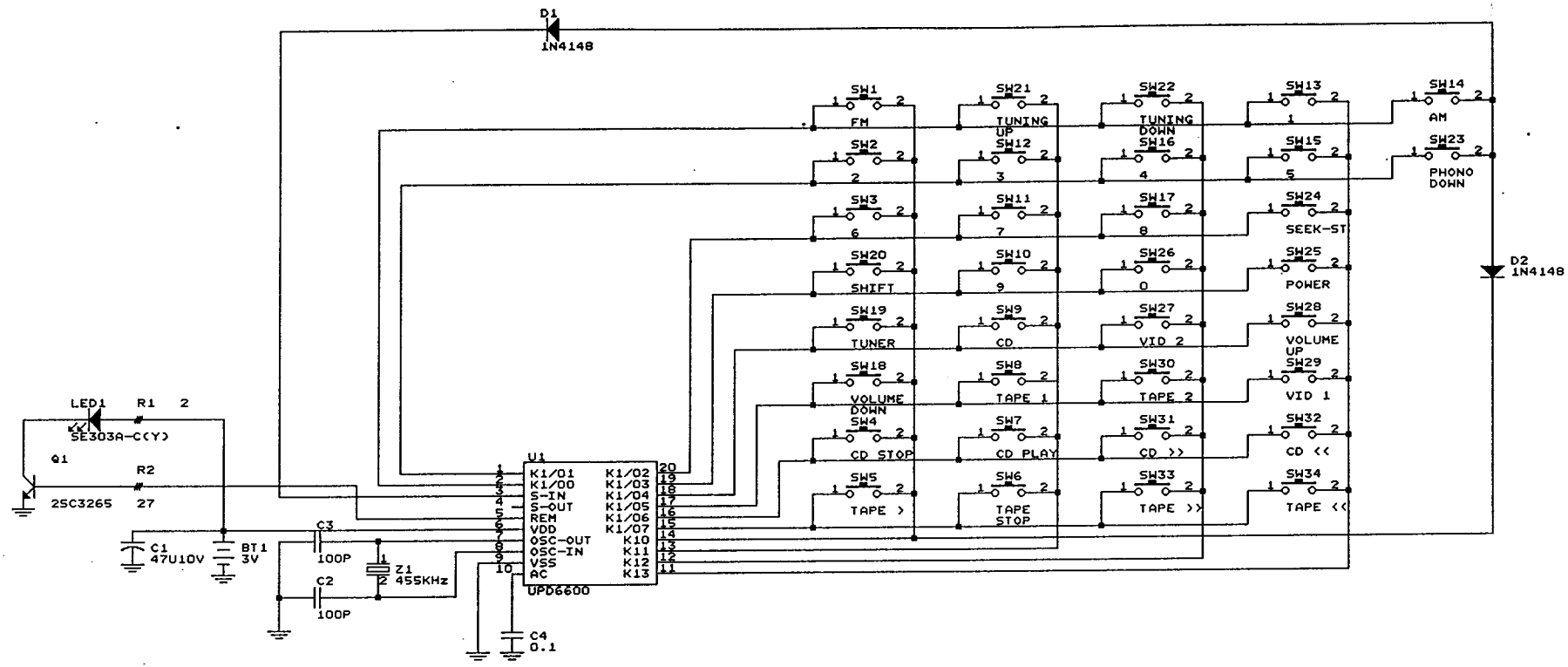
phono aux / DAD am fm

FUNCTION

2SB834 	TC4049BP HA11225 
2SK241 	TC4066BP TC4011BP 
2SJ103 	LA1245 
2SD669 2SB649 	AN6875 
2SB1034 	TD6104P 
D5FB20F1 	TC9147AP 
1S2471 RD5.6EB2 1S2473 HZ15-1L HZ7B2L HZ27-3L RD10EB1 RD8.2EB1 HZ24-1L RD3.0EB1 10DF2 	TD6301AP 

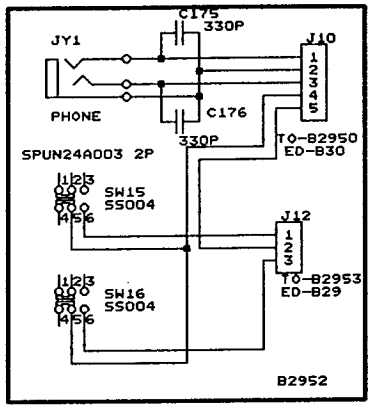
WIRE COLOR ABBREVIATIONS

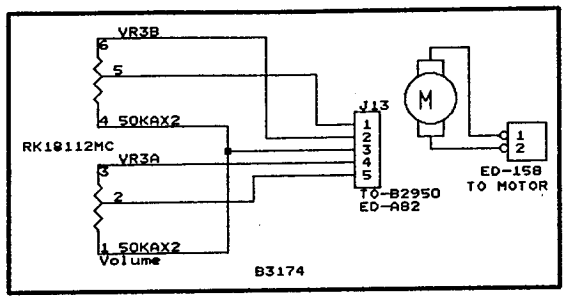
RED : Red	GRN : Green
WHT : White	ORG : Orange
BLK : Black	YEL : Yellow
GRY : Gray	BRN : Brown
BLU : Blue	

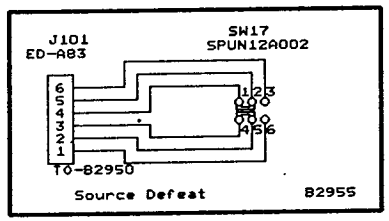


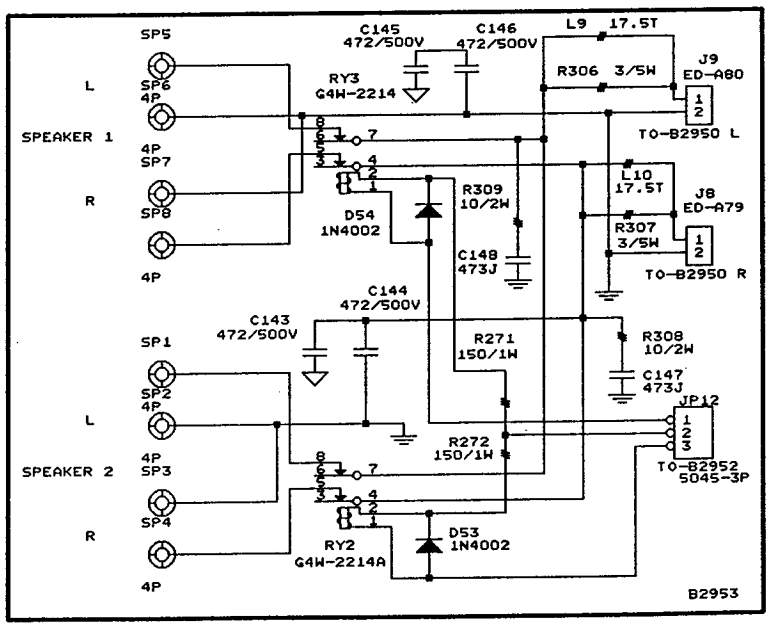
MODEL : HK690

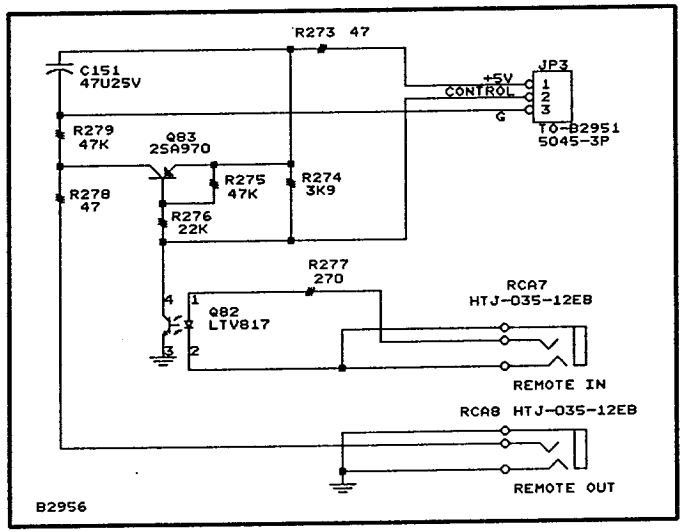
	HANGINE ELECTRONICS CO., LTD.	
Size A3	Document Number 69REMOTE.SCH	REV
Date: September 10, 1998	Sheet of	





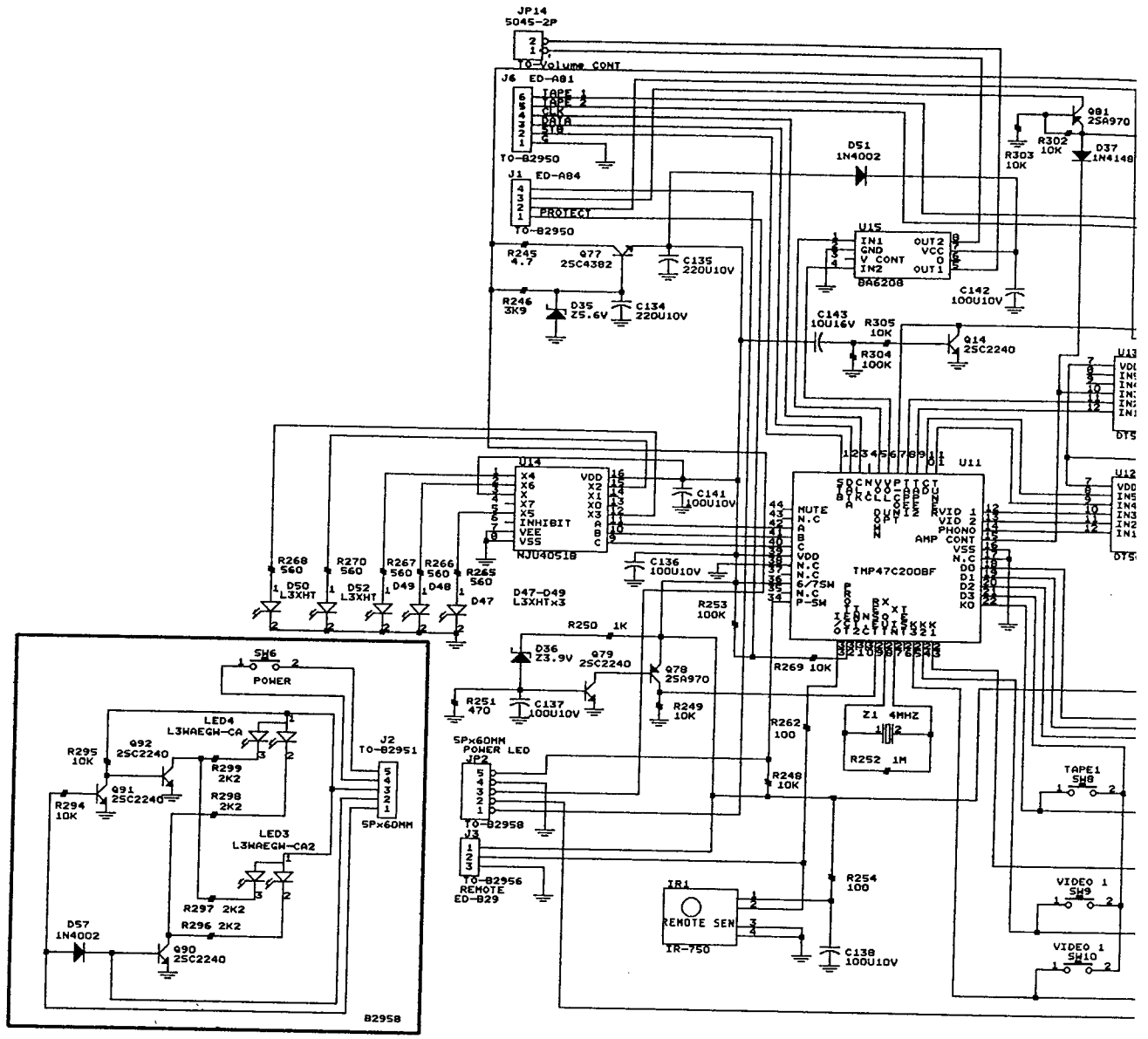


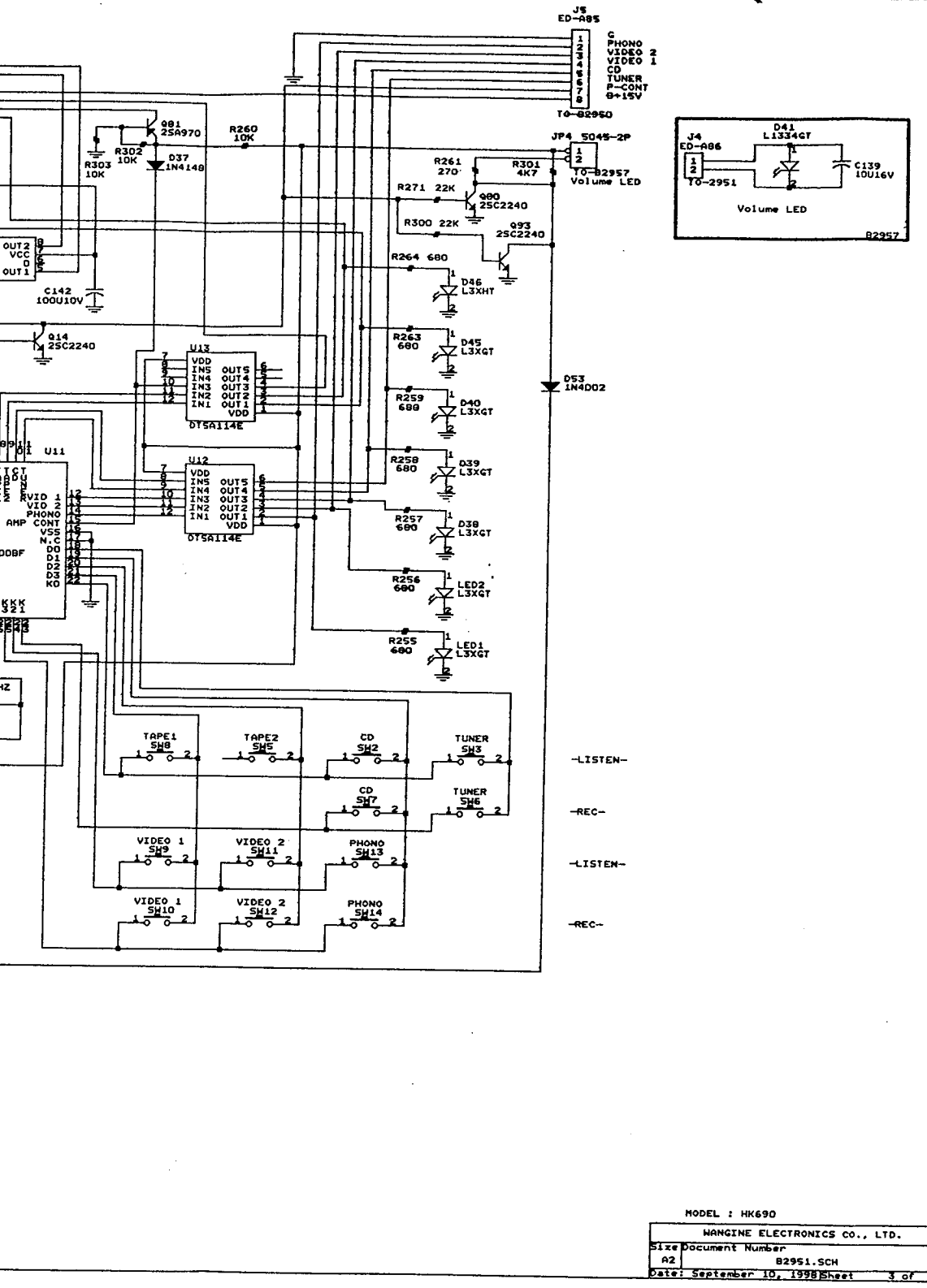




MODEL : HK690

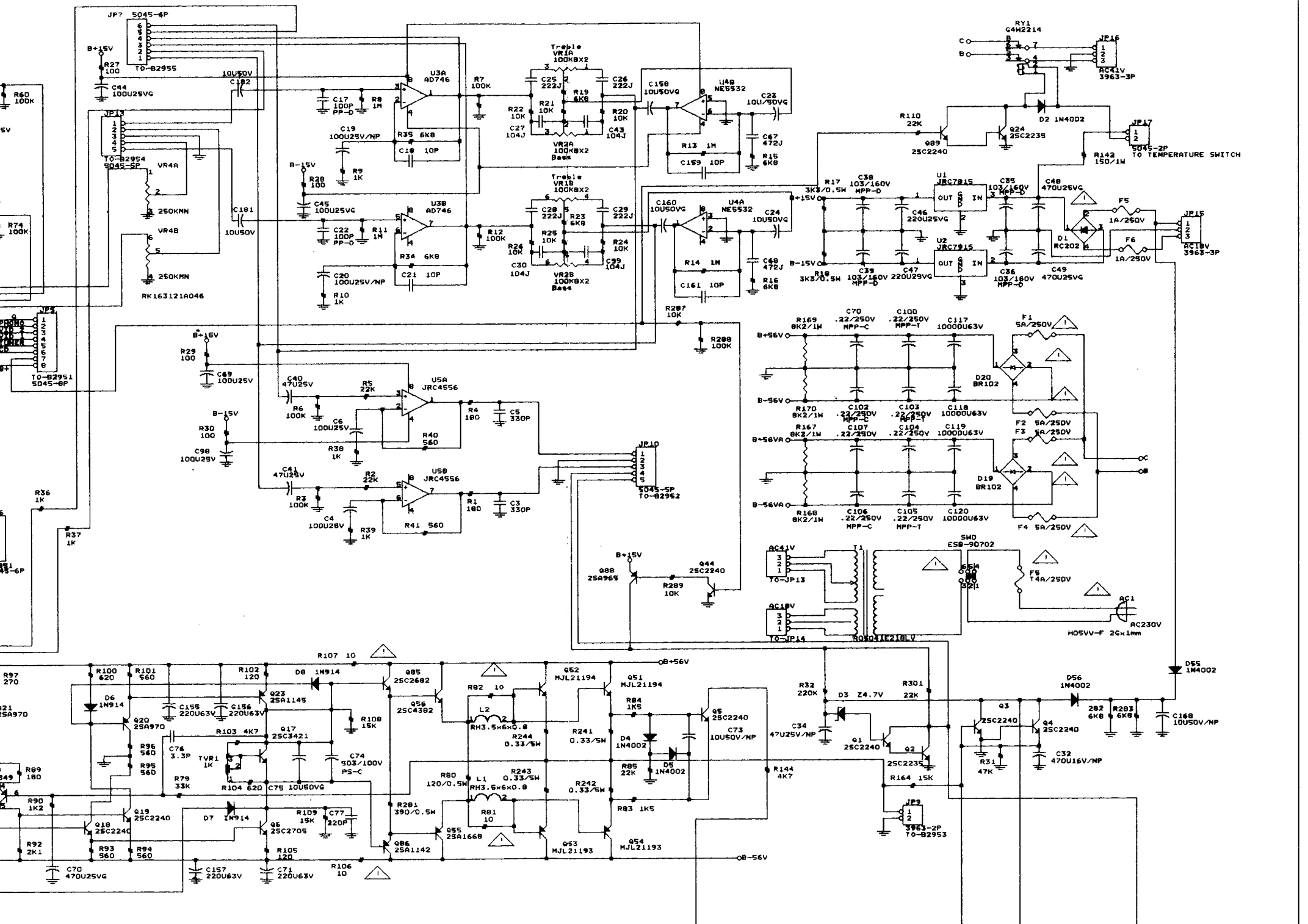
WANGINE ELECTRONICS CO., LTD.		
Size: A3	Document Number: B2952-6.SCH	REV
Date: September 10, 1998	Sheet 4 of 4	

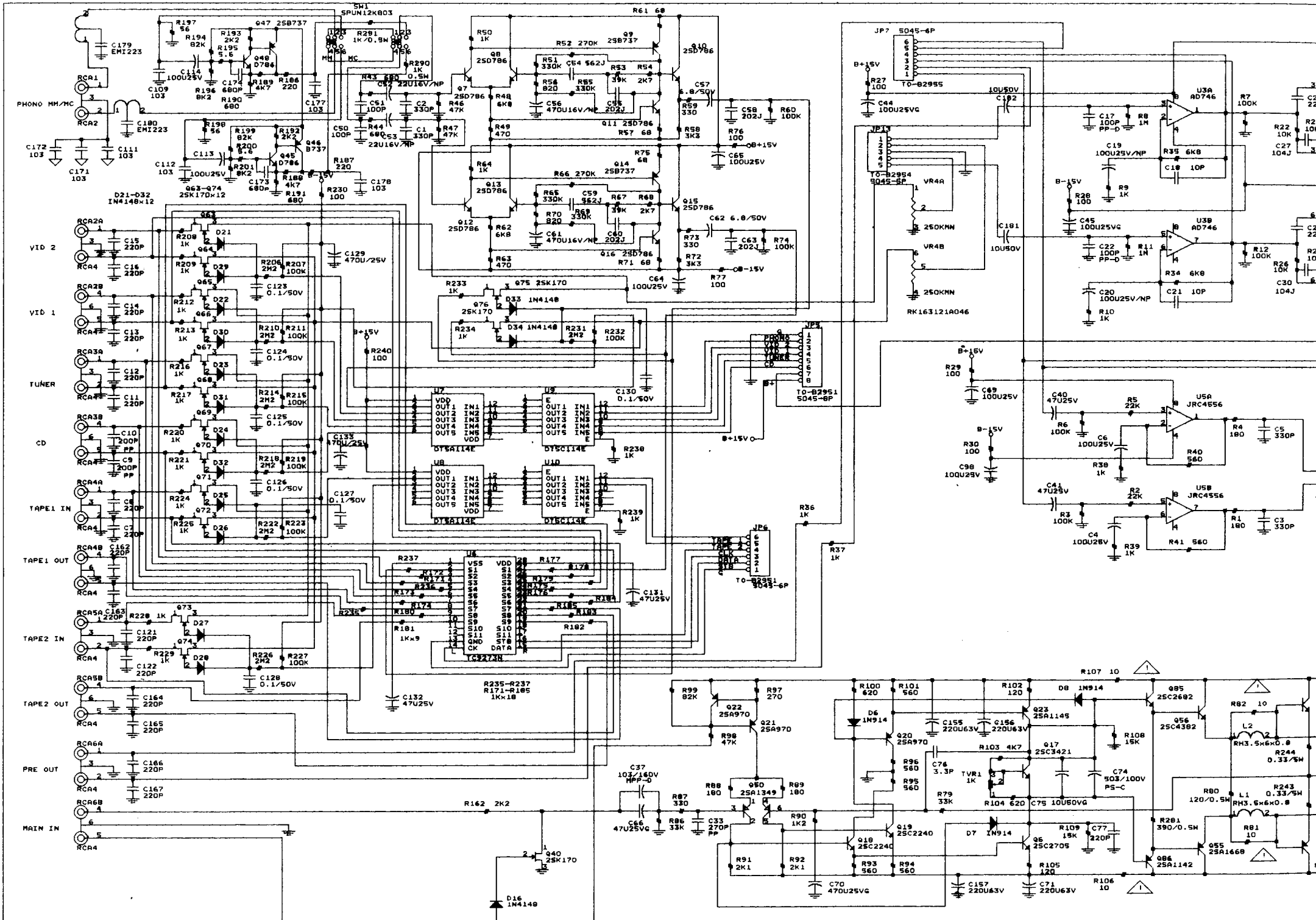

JP14
5045-2P
TO-Volume CONT
J6 ED-A81
TAPE 1
TAPE 2
CLK
DATA
STB
TO-82950
J1 ED-A84
PROTECT
TO-82950
R245 4.7
Q77 2SC4382
C135 220U10V
R246 3K9
D35 Z5.6V
C134 220U10V
D51 1N4002
Q81 2SA970
R302 10K
R303 10K
D37 1N4148
U15
IN1
GND
V CONT
IN2
OUT2
VCC
O
OUT1
BA6208
C142 100U10V
C143 10U16V
R305 10K
R304 100K
Q14 2SC2240
U14
X4
X6
X
X7
X5
INHIBIT
VEE
VSS
VDD
X2
X1
XO
X3
A
B
C
NJU4051B
C141 100U10V
C136 100U10V
R268 560
R270 560
R267 560
R266 560
R265 560
D50 L3XHT
D52 L3XHT
D49
D48
D47
D47-D49 L3XHTx3
U11
TMP47C2008F
MUTE
N.C
VDD
N.C
N.C
S/75M
N.C
P-SW
RVID 1
VID 2
PHONO
AMP CONT
R253 100K
R250 1K
D36 Z3.9V
Q79 2SC2240
Q78 2SA970
R269 10K
R251 470
C137 100U10V
R249 10K
R262 100
Z1 4MHZ
R252 1M
R248 10K
SW6
POWER
LED4
L3WAEGW-CA
Q92 2SC2240
R295 10K
R299 2K2
R298 2K2
Q91 2SC2240
R294 10K
LED3
L3WAEGW-CA2
R297 2K2
R296 2K2
D57 1N4002
Q90 2SC2240
J2
TO-82951
5Px60MM
B2958
5Px60MM
POWER LED
JP2
TO-82958
J3
TO-82956
REMOTE
ED-829
IR1
REMOTE SEN
IR-750
R254 100
C138 100U10V
TAPE1
SW8
VIDEO 1
SW9
VIDEO 1
SW10

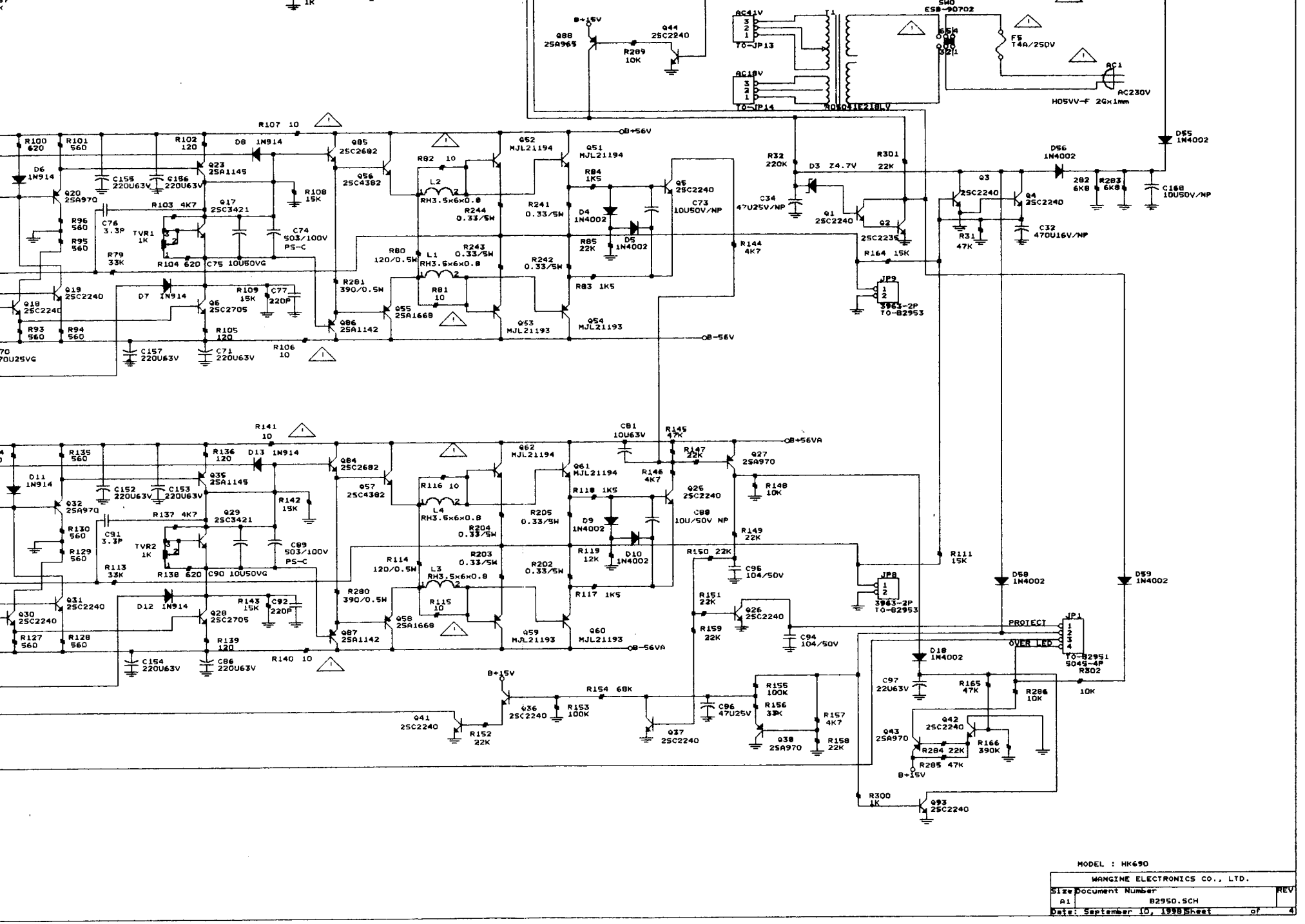


MODEL : HK690

WANGINE ELECTRONICS CO., LTD.		
Size A2	Document Number B2951.SCH	REV
Date: September 10, 1998	Sheet 3 of 4	

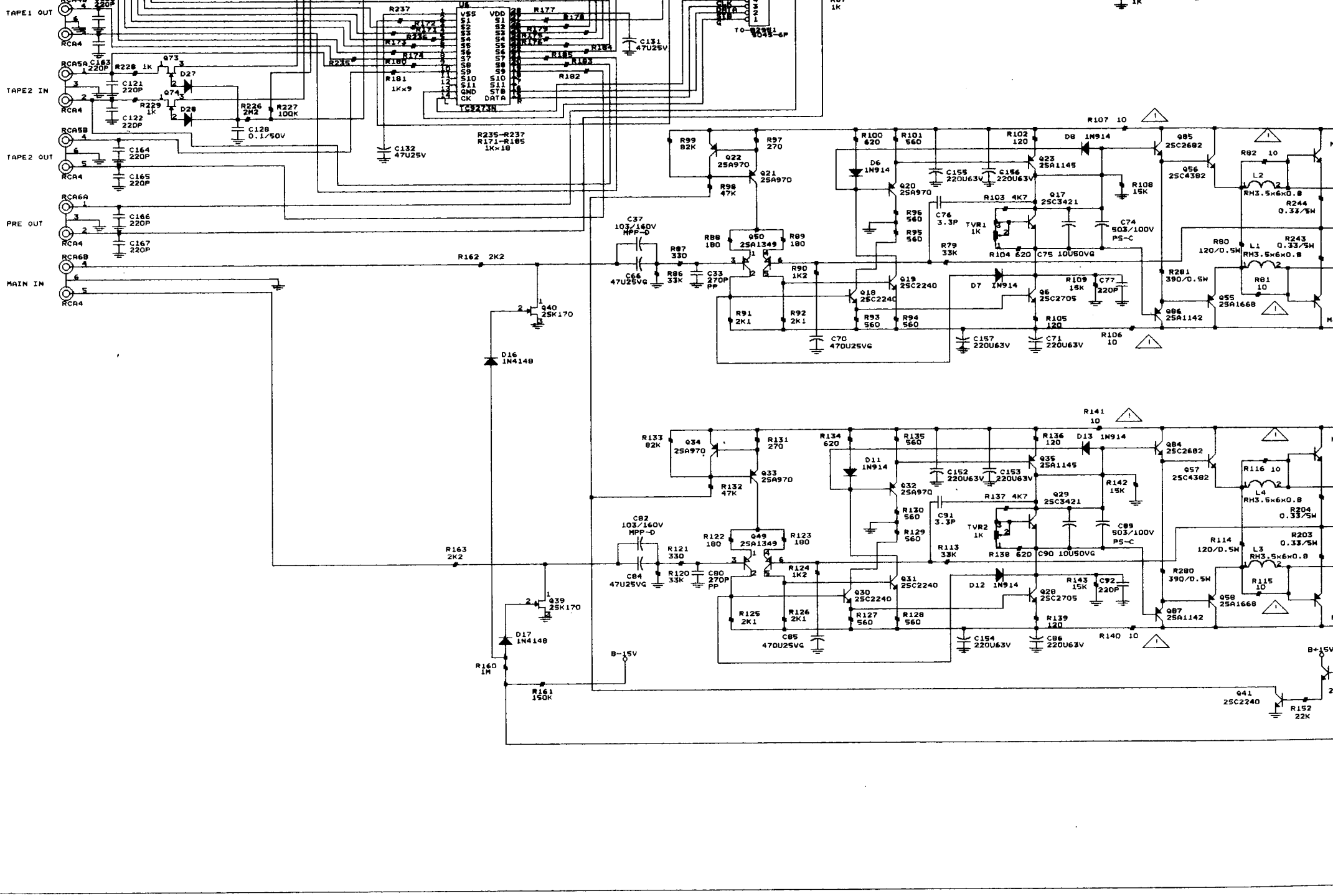

JP7 5045-6P
TO-82955
B+15V
R27 100
C44 100U25VG
10U50V C102
JP13
TO-82954 5045-6P
VR4A
250KMN
VR4B
250KMN
RK163121A046
C181
10U50V
U3A AD746
U3B AD746
C17 100P PP-D
R8 1M
C19 100U25V/NP
R35 6K8
C18 10P
R9 1K
R28 100
C45 100U25VG
C22 100P PP-D
R11 1M
R34 6K8
C20 100U25V/NP
C21 10P
R10 1K
B-15V
R7 100K
R12 100K
Treble VR1A 100KBX2
Bass VR2A 100KBX2
Treble VR1B 100KBX2
Bass VR2B 100KBX2
C25 222J
C26 222J
R19 6K8
R21 10K
R20 10K
C27 104J
C43 104J
C28 222J
C29 222J
R23 6K8
R25 10K
R24 10K
C30 104J
C39 104J
U4B NE5532
U4A NE5532
C158 10U50VG
C160 10U50VG
R13 1M
C159 10P
R14 1M
C161 10P
C23 10U/50VG
C24 10U50VG
C67 472J
C68 472J
R15 6K8
R16 6K8
R287 10K
R288 100K
JP5
TO-82951 5045-8P
B+15V
R29 100
C69 100U25V
C40 47U25V
R5 22K
R6 100K
C6 100U25V
U5A JRC4556
R4 180
C5 330P
R40 560
R38 1K
B-15V
R30 100
C98 100U25V
C41 47U25V
R2 22K
R3 100K
C4 100U25V
R39 1K
U5B JRC4556
R1 180
C3 330P
R41 560
JP10
5045-5P
TO-82952
R36 1K
R37 1K
B+15V
Q88 2SA965
Q44 2SC2240
R289 10K
RY1 G4W2214
JP16
AC41V 3963-3P
R110 22K
Q89 2SC2240
Q24 2SC2235
D2 1N4002
JP17
5045-2P
TO TEMPERATURE SWITCH
R142 150/1W
U1 JRC7815
U2 JRC7915
R17 3K3/0.5W
R18 3K3/0.5W
C38 103/160V MPP-D
C46 220U25VG
C39 103/160V MPP-D
C47 220U25VG
C35 103/160V MPP-D
C36 103/160V MPP-D
C48 470U25VG
C49 470U25VG
D1 RC202
F5 1A/250V
F6 1A/250V
JP15
AC18V 3963-3P
+15V
B-15V
B+56V
B-56V
B+56VA
B-56VA
R169 8K2/1W
R170 8K2/1W
R167 8K2/1W
R168 8K2/1W
C70 .22/250V MPP-C
C102 .22/250V MPP-C
C107 .22/250V
C106 .22/250V MPP-C
C100 .22/250V MPP-T
C103 .22/250V MPP-T
C104 .22/250V
C105 .22/250V MPP-T
C117 10000U63V
C118 10000U63V
C119 10000U63V
C120 10000U63V
D20 BR102
D19 BR102
F1 5A/250V
F2 5A/250V
F3 5A/250V
F4 5A/250V
AC41V
TO-JP13
AC18V
TO-JP14
SW0 ESB-90702
F5 T4A/250V
AC1
AC230V
H05VV-F 2Gx1mm
R107 10
R100 620
R101 560
R102 120
D8 1N914
D6 1N914
Q23 2SA1145
Q20 2SA970
C155 220U63V
C156 220U63V
R108 15K
R103 4K7
Q17 2SC3421
TVR1 1K
C76 3.3P
C74 503/100V PS-C
R96 560
R95 560
R79 33K
R104 620
C75 10U50VG
R89 180
R90 1K2
Q19 2SC2240
Q18 2SC2240
R92 2K1
R93 560
R94 560
C70 470U25VG
C157 220U63V
C71 220U63V
D7 1N914
R109 15K
C77 220P
R105 120
R106 10
Q85 2SC2682
Q56 2SC4382
Q86 2SA1142
Q55 2SA1668
R82 10
L2 RH3.5x6x0.8
R244 0.33/5W
R80 120/0.5W
L1 RH3.5x6x0.8
R243 0.33/5W
R81 10
R281 390/0.5W
Q52 MJL21194
Q51 MJL21194
Q53 MJL21193
Q54 MJL21193
R84 1K5
R241 0.33/5W
D4 1N4002
R85 22K
D5 1N4002
R242 0.33/5W
R83 1K5
Q5 2SC2240
C73 10U50V/NP
R144 4K7
B+56V
B-56V
R32 220K
D3 Z4.7V
R301 22K
C34 47U25V/NP
Q1 2SC2240
Q2 2SC2235
R164 15K
JP9
3963-2P
TO-82953
D55 1N4002
D56 1N4002
Q3 2SC2240
Q4 2SC2240
R31 47K
C32 470U16V/NP
R282 6K8
R283 6K8
C168 10U50V/NP


PHONO MM/MC
VID 2
VID 1
TUNER
CD
TAPE1 IN
TAPE1 OUT
TAPE2 IN
TAPE2 OUT
PRE OUT
MAIN IN
SW1 SPUN12K803
D21-D32 IN4148×12
Q63-Q74 2SK170×12
TC9273N
R235-R237 R171-R185 1K×18
R181 1K×9
D16 1N4148
D33 1N4148
D34 1N4148
JP7 5045-6P
JP13
JP5
JP6
TO-92954 5045-5P
TO-92955
TO-92951 5045-6P
VR4A 250KMN
VR4B 250KMN
RK163121A046
U3A AD746
U3B AD746
U5A JRC4556
U5B JRC4556
B+15V
B-15V
B+
R107 10
R162 2K2
R235 390/0.5W
R236 390/0.5W
R240 100
R241 390/0.5W
R242 390/0.5W
R243 0.33/5W
R244 0.33/5W



MODEL : HK690

WANGINE ELECTRONICS CO., LTD.		
Size A1	Document Number B2950.SCH	REV
Date: September 10, 1998	Sheet of	4


TAPE1 OUT
TAPE2 IN
TAPE2 OUT
PRE OUT
MAIN IN
RCA4
RCA5A
RCA5B
RCA6A
RCA6B
C163 220P
C121 220P
C122 220P
C164 220P
C165 220P
C166 220P
C167 220P
R228 1K
R229 1K
Q73
Q74
D27
D28
R226 2M2
R227 100K
C128 0.1/50V
C132 47U25V
C131 47U25V
R235
R236
R237
R171
R172
R173
R174
R175
R176
R177
R178
R179
R180
R181 1Kx9
R182
R183
R184
R185
U8
VSS S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11 GND CK
VDD S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11 STB DATA
TC9273N
R235-R237
R171-R185
1Kx18
TO-9295
9045-6P
R107 10
R99 82K
R97 270
Q22 2SA970
Q21 2SA970
R98 47K
R100 620
R101 560
R102 120
D8 1N914
Q85 2SC2682
D6 1N914
C155 220U63V
C156 220U63V
Q20 2SA970
Q23 2SA1145
R108 15K
R96 560
R95 560
C76 3.3P
R103 4K7
Q17 2SC3421
TVR1 1K
C74 503/100V PS-C
R79 33K
R104 620
C75 10U50VG
R82 10
L2 RH3.5x6x0.8
R244 0.33/5W
Q56 2SC4382
R80 120/0.5W
L1 RH3.5x6x0.8
R243 0.33/5W
R81 10
R281 390/0.5W
Q55 2SA1668
Q86 2SA1142
R105 120
R106 10
C157 220U63V
C71 220U63V
C70 470U25VG
R91 2K1
R92 2K1
R93 560
R94 560
Q18 2SC2240
Q19 2SC2240
D7 1N914
Q6 2SC2705
R109 15K
C77 220P
C37 103/160V MPP-D
R87 330
C66 47U25VG
R86 33K
C33 270P PP
R88 180
Q50 2SA1349
R89 180
R90 1K2
R162 2K2
Q40 2SK170
D16 1N4148
R141 10
R133 82K
Q34 2SA970
R131 270
Q33 2SA970
R132 47K
R134 620
R135 560
R136 120
D13 1N914
Q84 2SC2682
D11 1N914
C152 220U63V
C153 220U63V
Q35 2SA1145
Q32 2SA970
R142 15K
R137 4K7
Q29 2SC3421
R130 560
C91 3.3P
TVR2 1K
C89 503/100V PS-C
R129 560
R113 33K
R138 620
C90 10U50VG
R116 10
L4 RH3.5x6x0.8
R204 0.33/5W
Q57 2SC4382
R114 120/0.5W
L3 RH3.5x6x0.8
R203 0.33/5W
R115 10
R280 390/0.5W
Q58 2SA1668
Q87 2SA1142
R139 120
R140 10
C154 220U63V
C86 220U63V
C85 470U25VG
R125 2K1
R126 2K1
R127 560
R128 560
Q30 2SC2240
Q31 2SC2240
D12 1N914
Q28 2SC2705
R143 15K
C92 220P
C82 103/160V MPP-D
R121 330
C84 47U25VG
R120 33K
C80 270P PP
R122 180
Q49 2SA1349
R123 180
R124 1K2
R163 2K2
Q39 2SK170
D17 1N4148
R160 1M
R161 150K
B-15V
B+15V
Q41 2SC2240
R152 22K